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WOLF, MASTIFF, AND SPANIEL.

I REMEMBER once, in Boston, being startled and somewhat pained to hear America's great humorist, Wendell Holmes, enunciate the opinion, with which, as expressed in print, I had long been familiar enough, that, as seen from certain points of view, Englishmen are children compared with their American cousins. I was not comforted by the remembrance that in his "Professor at the Breakfast-Table," where the opinion is expressed, he had said that he would not let out the fact of the real American feeling about Old World folk, except in converse with Englishmen sensible enough to avoid mistaking the feeling for personal conceit. Unfortunately, the proposition has at least some degree of truth in it, though be it noted that an immense proportion of the American population are fully as childish about the same matters, though in another way.

Holmes was talking, however, of Americans of the old England type—to be found throughout the States, but certainly not forming the majority of the present American people. It must be admitted even by the most anti-Bostonian Americans (who, indeed, may abuse Boston, but Americans are all proud of her) that the old England type is the most innately independent type of manhood the world has known. People more free-and-easy, more don't-care-a-cussative, if one might use such a word, there are in other parts of America, as, indeed, there are in many parts of the old country—the mining districts for example—but there are none who have more definitely, more logically, or therefore more thoroughly adopted the faith that men are entitled to full freedom and individual independence.

It is true enough, as Holmes has said, that "a whole museum of wigs and masks and lace coats and gold sticks and grimaces and phrases is still used in the Old World puppet-shows." "I don't think," he says, "that we Americans ever understand the Englishman's concentrated loyalty and specialised reverence. But then we *do* think more of a man as such (barring some little difficulties about race and complexion we will touch on presently) than any people that ever lived did think of him. Our reverence is wider, if it is less intense. We have caste among us to some extent, it is true; but there is never a collar on the American wolf dog, such as you often see on the English mastiff, notwithstanding his robust, hearty individuality."

If the collar is now very often not seen on our English mastiffs, it is too true, as Holmes has said elsewhere, that the mark of the collar is apt to be left. Considering the English people generally, it may be said that true freedom of thought is tolerated only, not welcome in England, at present. It is "struggled up to and held antagonistically, not spontaneously," save in a few altogether exceptional cases, where men who were in advance of their time a few generations back have handed down as a family tradition a true faith in the dignity of manhood, and the right of men to individual independence.

Such exceptional cases are not understood, I think, by Americans, even by such as Holmes, Emerson, and the like; nor can they readily understand that in other cases fulness of mental freedom may be attained even by those who at a great price have purchased it. "You may teach a quadruped," says Holmes, "to walk on his hind legs; but he is always wanting to walk on all fours." The comparison is unfair, and a trifle rude, a fault not common with Boston's genial humorist. The freedom of mind which Holmes regards as the birthright of America has come to the American through his English blood. It has fuller play in America and so finds freer expression; but it is of English origin. When that freedom was won, America, regarded as a nation, had no existence. Britons in America fought Britons from over the water (Britons ruled by a German king) for freedom, and fought successfully—even as Englishmen at home fought other Englishmen, ruled by a Scottish king, for their rights a century before, and won them.

When America first became American, liberty had already been achieved for the new-born nation. And if, at this day, the whole population of England could be transplanted to America (as a consequence of some such event as Emerson imagined in his "English Traits," and as some less friendly Americans conceive, oddly enough, to be probable) the result would be not a diminution of America's independence of feeling, but a vast development of it. There would be a new growth of Bostonian Americanism (by which I mean the spirit of resistance to popular as well as to personal tyranny), not any retardation of America's development as a great free nation.

Unless I am greatly mistaken—and if I am many Americans have made the same mistake—such dangers as there are for America's future would not be increased, but measurably diminished, by any considerable influx of that strain of British blood to which America owes the men who made her what she is, as well as those of the present era who stand highest in European esteem. It would be idle to say that America's future is threatened by no dangers; Englishmen in particular recognise one danger to which America is exposed, against which all the resolution of her most steadfast citizens will ere long be required. Her friends hope, and fully believe, that she will surmount the dangers which lie ahead, even as she has surmounted those which surrounded her in the past. But it is an easy prophecy to say that if or when she overcomes those dangers it will be by the exercise of qualities akin to those which the great Americans of a century ago displayed—and those Americans were, without exception, British—purely British by birth or by descent, and actually British in the sense in which Canadians, Australians, and Cape Colonists are regarded as British until such time as they cast loose the ties which connect them with their kinsfolk in the old home-nest.

Those take but a purblind view of history as well as biology who imagine that three or four generations—or ten or twelve, for that matter—affect the quality of race blood; insomuch that Americans who abuse British qualities, and Englishmen who abuse American qualities, show themselves (individually only, thank God!) of the nature of those birds whom the good old proverb denounces because they "foul their own nest."

It cannot, unfortunately, be denied that in the England of to-day false loyalties are still rife, though they are steadily diminishing in prevalence. When Gorgius IV., of Brentford, visited Haggisland (as Thackeray presents the "o'er true tale"), the Baron of Bradwardine—a man worth

more to the human race than all the stalwart Porkers of Brawnswick who ever ruled over Brentford, or than even all the monarchs who have swayed the destinies of greater nations—abased himself before that padded humbug. But probably while Gorgius IV. was alive not five in ten saw aught of degradation in such abasement, and not two in the five would have ventured to express their feelings. Many doubtless envied the Sheriff his right (let us hope he had some right) to pocket the goblet out of which the First Gentleman in Europe—alas, I have let the august cat out of the awful bag! I should have said, "the august and most gracious ruler of Brentford"—had taken, after his fashion, more wine than was good for him.

The great man—most emphatically, I do not mean Gorgius IV.—by an odd chance, sat down on the goblet, and not only broke it into fragments, but ruined his own coat-tails. Many laughed when they heard of this. But it was not because they thought his purpose of consecrating that goblet to future uselessness was an absurd one. They only laughed, after the fashion of human nature, because that purpose had failed. Many in those days—and, alas! I fear many are of the same mind now—would not have thought it altogether absurd if Sir Walter Scott (again the cat gets out of the bag—I should have said the Baron of Bradwardine) had made a pennon of his damaged swallow-tails, and let them wave thereafter in the baronial halls of Bishopsbridge in memory of the service in which they had suffered injury.

In our times manners and customs are no longer as they were in the "good old days" of Brentford. Snobs there are and always be; these poor (in spirit) we have always with us. When we remember how a set of snobs (women, too, whose degradation pains the mind more than any number of masculine snobs) rushed in where a certain princess had been eating cherry-pie, and seized the cherry-stones left by her august lips upon the precious plate whence she had eaten, and preserved those rather unpleasant objects as sacred relics—we cannot speak of the Brentford people as altogether regenerate even in these days. I have even heard of American women who have not felt it degrading to proclaim that they have lost no chance of seeing—*seeing!*—the niece of Gorgius IV., now Queen in Brentford. But at least no one whom the world respects has ever debased himself in our time, or in any British country, as did Bradwardine's Baron when the century was yet young.

A yet better sign is this, that those who in our time reject the false loyalties which degrade no longer show by a contrary fault how strongly the spring had been bent the other way! Men are beginning to learn in my own loved country, as the wiser have long learned in the United States, that it is a weakness to be moved either one way or another by titles and dignities, by wealth, by influence, or by power. It begins to be recognised that one who shows either subservience on the one hand, or discourtesy on the other, towards those whom the silly cant of old times called persons of rank (as if there were only one way of ranking people, and that way a foolish one), or whose conduct is *in any respect whatsoever* different towards them from what it would be towards others possessing similar qualities, mental and moral, has not yet reached the dignity of full-grown manhood. Such folk are not, indeed, to my judgment, rightly described by Holmes as "children," in the sense in which the savage is a child. They are rather the hobble-de-hoys of civilisation. Their "your majesty," "my lord," and so forth suit them very well, even as the "sir" with which the stripling continues to address the pastors and masters of his boyhood is appropriate enough to the stage of life through which the lad is passing. It is better than discourtesy, precisely as the formal politeness of the youth to those above him for the time in standing and experience is better than a brusque manner or rude demeanour, and promises a more dignified manhood. But it is only appropriate where there actually is a difference of standing in the qualities constituting the fulness of manhood; and no man who respects the dignity of manhood will recognise any such difference as between the titled and the untitled, the wealthy and the poor, those possessed of power and those who have no other sway but o'er themselves. When the stripling who has very rightly shown a respectful demeanour towards his seniors becomes a man, neither formal courtesy on the one hand, nor rudeness on the other, becomes him. And what is true of individual manhood is true also of the manhood of civilisation, which has not yet, however, been fully reached in any country or among any race either in the old world or in the new.

There is something to be said, after all, in defence, if not in favour of the form of loyalty which Americans, according to Wendell Holmes, so little understand. It is the rudimentary representative in our time of what was once a true and very useful form of loyalty. The ancestors of Baron Bradwardine, for instance, when they showed in council or in field their loyal devotion either to the ruler of Haggisland or to their own immediate chieftain, showed loyalty to their country or their clan. The faithful service, even the personal service, of king or chief, was often in those days equivalent to faithful service in the common cause of all who were led by him. The modern Baron of Bradwardine, Sheriff of the capital city of Haggisland, no warrior but a wizard, with his pen did not present a very dignified scene when he sat upon the goblet from which the royal lips of Brentford's king had drunk wine; nor was there any value for his country in what he thus endured in the royal cause; but the worthless loyalty he thus ingloriously displayed was derived from what had been true loyalty among his predecessors. Being akin to a quality which when it throve best led to deeds of heroism it could not be wholly contemptible; yet could it no more be compared with the valuable loyalty of old days than the boot licking of a modern courtier can be compared with the devotion of a Bayard to his country.

It must be admitted, however, that the loyalty of our times is sometimes hardly saved, even by its remote kinship with true self-sacrificing loyalty—displayed towards a person but in the cause of a people—from becoming absurd, if not contemptible. The mastiff of the fable, whose neck showed the mark of the collar, even when the collar was removed, was not altogether proud of the distinction. Perhaps had he been a lady's spaniel he might have regarded it as a distinction: in that case when the wolf asked what it meant, he might have replied (always providing the wolf had not eaten him up first) that he was proud to wear his mistress's collar, and could therefore have no objection to bear the visible traces it had left on his neck. But then the moral of the fable would have gone more strongly against that spaniel than against Æsop's mastiff. To the latter the wolf simply objected that he preferred liberty and hunger to slavery and a full stomach: he would have answered the spaniel more forcibly.

The moral of the modified fable is not far to seek. Americans who, like Dr. Wendell Holmes, somewhat contemptuously regard the mark of the collar on the British mastiff, may understand from the experience of their own nation, directly sprung from, nay, *made by* the British race bearing such a mark, that it implies no real degradation of character. It is but skin deep, and has been shown again and again to be consistent with faithful courage and steady loyalty of the truest kind. Our British race knows in America, as in the old home—and the nations know—that personal loyalty, though no longer meaning quite what it

did of yore, is still very closely akin to true patriotism. But the noisy British yelp of poodledom, just now heard rather too frequently, both in the old country and abroad, is not pleasing to the ears either of native Britons or of the descendants from old Britain here. There must be a strain of savagery, that is, of undeveloped race-manhood, in all races, even the most advanced—even as in the world at large there are still present races akin in all their ways to the Neolithic, even to the Palæolithic races of pleistocene time. But these antiquated types are not the credit but the disgrace of the times which they have unhappily survived.

THE STORY OF CREATION.

A PLAIN ACCOUNT OF EVOLUTION.

By EDWARD CLODD.

PART II.

CHAPTER VII.—SOCIAL EVOLUTION.—(*Concluded.*)

EVOLUTION of Morals.—Man by himself is not only unprogressive, he is also unmoral. For where there is no society there is no sin. Therefore the bases of right and wrong lie in conduct towards one's fellows; the moral sense or conscience is the outcome of social relations. The common interests which impel to combination involve praise or blame of the acts of each individual in the degree that they aid or hinder the well-being of all; in other words, add to their pleasure or their pain, and this praise and blame constitute the moral code, the collective or *tribal conscience*. Society, like the units of which it is made up, has to fight for its life, and all primitive laws are laws of self-preservation. Self-preservation is based on sympathy between the several members, and it is therefore the ultimate foundation of the moral sense; whatever is helpful to it is *right*, whatever is a hindrance to it is *wrong*. Although union involves limitation and restraint, so that the units can no longer do exactly as they like, self-interest comes into play, since a man best insured respect for his own rights by respecting the rights of others. Society is not possible where a man is not true to his fellow; there is, as the phrase goes, honour among thieves, probably even among savages as low as the Jolas of Gambia, every one of whom does as he likes, the most successful thief being the greatest man. In that model of sound and clear reasoning, so refreshing a contrast to the tedious word-mongering of most writers on ethics, Darwin's chapter on the growth of the moral sense, he points out how man's instinctive sympathy would lead him to value highly the approval of his fellows, and how his actions would be determined in a high degree by their expressed wishes; unfortunately, often by his own selfish desires. But while the lower instincts, as hunger, passion, and thirst for vengeance, are strong, they are not so enduring or satisfying as the higher feelings which crave for society and sympathy. And the yielding to the lower, however gratifying for the moment, would be followed by the feeling of regret that he had thus given way, and by resolve to act differently for the future. Thus at last man comes to feel through acquired and perhaps inherited habit that it is best for him to obey his more persistent impulses.* It is this self-accusing feeling of remorse (literally, *biting again*), due to power of reflection on actions and motives, which makes the difference so profound between man and the lower animals, whose moral sense does not advance beyond the stage which commits or avoids certain acts according as they are remembered as pleasurable or painful to the creature itself.

Special value would be set by the tribe upon brave and unselfish acts as contributing to the commonweal; praise and honour would reward the doer, encouraging that love of the tribe in which lay the germ of love of country. For he who is not a good citizen cannot be a true patriot, and he who holds not his fatherland dear can never become a well-wisher to mankind. The conceptions which these larger interests involve are, however, of very slow growth; for a long time the feeling of rightness and wrongness was limited to acts harmful or helpful to the tribe; in fact, that which was a crime within its borders became a virtue, and even a duty, outside them. What Cæsar says of the ancient Germans—"Robberies beyond the bounds of each community have no infamy, but are commended as a means of exercising youth and lessening sloth"*—still applies to barbaric peoples, and has its survival in the slowly-decaying prejudices of civilised nations.

Morals are relative, not absolute; there is no fixed standard of right and wrong by which the actions of all men throughout all time are measured. The moral code advances with the progress of the race; conscience is a growth. That which society in rude stages of culture approves, it condemns at later and more refined stages, although such is the power of custom in investing the old with sanctity, such the persistence of authority and so deep its interest against change, that moral qualities are grafted upon acts apart from any question of their bearing upon character. Such, for example, are the prohibitions against certain foods and the commands to keep certain days sacred; such also the tyranny of caste, as among the Bhattias of India, who regard dining at an hotel as a greater sin than murder. Among the Mohammadan sect of the Wahhabees murder and adultery are venial offences compared to the smoking of tobacco. Among many savage peoples it is worse to marry a girl within the tribe than to murder one of another tribe. Among ourselves society condones a seduction, but not a *mésalliance*, and forgives an offence against etiquette less readily than an act of dishonour.

The alterations in criminal codes witness to progress in morals. Not to go further back when laws punishing heresy and witchcraft were in force; within the present century, people were burned to death for coining false money, hanged for stealing a few shillingsworth of goods, and imprisoned for paltry debts, death being often the only bringer of release. Among the sights of London were the procession of condemned criminals to Tyburn every six weeks, and the auctions of negroes at the Poultry Compter. These and a hundred other barbarities went on without protest from the humane, whether Christians or non-Christians, for the collective conscience did not question their rightness, and their abolition was ultimately due to the efforts of individuals in whom a higher sense of human rights and duties was aroused, and through whom the general moral tone was advanced. That heightened tone, which is a yet stronger note of our time, is, in the main, due to the progress of science, using the term as including not merely knowledge of the operations of nature, but knowledge of human life as affected by divers causes, and of the community of blood of all mankind.

It is this which has broken down the barriers of prejudice between the classes of each nation and between nations themselves, bringing home the force of the Italian proverb, "tutto il mondo è paese"—"all the world is one country."

* "Descent of Man," chap. iv.

* "Comm.," book vi., chap. 23.

This larger view extends the range of human sympathy and of the service of man to his fellows, as well as to the lower animals, which that sympathy inspires. Terrible are the ills which the misuse of knowledge in the hands of the selfish and the ruffian inflicts, but these are as dust in the balance against the good which has been wrought. The conduct of a nation is no longer regulated solely by its own interests without regard to what is due to others, neither does it draw its sanction from the tribal legislation of a barbaric past, but from what, after ages of dearly-bought experience, has proved itself to be best for man. In this, as in aught else which endures, nothing is rigid or final. Man's capacity can never overtake his loftiest ideals, although in their conception is the spur to their pursuit. What dead weight of care do morals, thus regarded, lift from the heart of man—what new energy is given to his efforts! Thought becomes fixed on the evolution of goodness instead of on the origin of evil; time is set free from useless speculation for profitable action; evils once deemed inherent in the nature of things, and therefore irremovable, are accounted for and shown to be within his power to extirpate.

In proving the unvarying relation between cause and effect in morals as in physics, science gives the clue to the remedy for moral ills. Moreover, that which man calls sin is shown to be more often due to his imperfect sense of the true proportion of things, and to his lack of imagination, than to his wilfulness; "evil is wrought by want of thought as well as want of heart." As Herbert Spencer says, "feelings, not ideas, govern the world," and the lack of imagination, which is itself largely due to defective training of the intellect, prevents a man from putting himself in the place of others, and deprives him of that sympathy which is essential to the unselfish life. The terrible mass of wrongdoing can only be lessened and finally removed by suppression of the over-self; by the maintenance of the balance between such care of one's self as shall best fit us for the service of man, and such thought for others as shall inflict on them no suffering through our selfishness, nor loss through our gain.* The crises of history are now rare when great principles or causes, demanding the sacrifice of the individual life, are at stake, but the world has never lacked a Curtius, and the spread of the scientific spirit has not proved fatal to the heroic.

Especially is science a preacher of righteousness in making clear the indissoluble unity between all life past, present, and to come. We are only on the threshold of knowledge as to the vast significance of the doctrine of heredity, but we know enough to deepen our sense of debt to the past and of duty to the future. We are what our forefathers made us, *plus* the action of circumstances on ourselves, and in like manner our children inherit the good and evil, both of body and mind, that is in us. Upon us, therefore, rests the duty of the cultivation of the best and of the suppression of the worst, so that the future of the race suffers not at our hands. More imperious is that duty, since nothing—not omnipotence itself—can step in between us and the consequences of our acts. Our sins are sins against our fellow-man; he alone can forgive us, although he cannot cancel their effects. "Our deeds are like the children born to us, they live and act apart from our own will. Nay, children may be strangled, but deeds never." †

Self-conquest lies in obedience, obedience lies in knowledge; and if to know that it rests with man to make or to mar the lives of others be not sufficing stimulus to learning the true that we may do the right, no other motive can avail. Experience shows that the threats of punishment and the promises of a reward in an after-life have the smallest effect on conduct; their remoteness exhausts their power, and, moreover, the belief in them is slowly decaying.

For the conduct of life brief maxims are enough; all the law and commandments are in the golden rule; all ethics in the teaching that if man be true to himself he cannot be false to his fellows; while in the knowledge that life's demands will always exceed its opportunities we may feel

> How fair a lot to fill
> Is left to each man still.

Evolution of Theology.—Theology may be defined as dealing with man's relations to the god or gods in whom he believes; morals, as dealing with his relations to his fellow-men.

Unfortunately, the two have become a good deal mixed in the degree that conduct has been made to rest on supposed divine commands as to what men shall and shall not do, an assumption which serves a useful purpose as a restraint upon the brutal and ignorant, but which has been a powerful engine of terrorism in the hands of the unscrupulous and fanatical. The confusion, however, disappears when it is seen that the evolution of belief in spiritual beings is a thing apart from the evolution of morals which, as has been shown, are based on social instincts and sympathies guided by reason and strengthened by inheritance and practice. For primitive theology is primitive science; it is the outcome of man's first efforts to explain the nature of his surroundings, and of the divers influences which affect him for good, and, still more, for ill. At this stage of his mental growth the emotions have foremost play, for feeling precedes reason, and its exercise is more easy, its results more rapid, although, on that account, less trustworthy. Moreover, the phenomena on which experience, as the sole guide to true knowledge of things, is based, are too vast for a single life to compass, even were the reasoning faculty capable of dealing with them. It needed the lapse of time ere man found out how his senses tricked him at every turn, and ere he could form any conception of orderly relation in his surroundings. So far as effort to supply his lower needs sharpened his wits, he did not go far astray; in his struggle against material foes the weapons of his warfare were carnal; but as against spiritual powers he was defenceless. Ignorance, always the mother of mystery, made him the slave of his fears. The universal instinct of the savage leads him to ascribe an indwelling life to everything that moves, from the sun in heaven to the rustling leaves, and the stones that roll from the hillside across his path. In this he acts as we see shying horses, timid pups, and young children act, until they learn from experience what things move of their own accord and what things do not. Shakespeare might have added Caliban to "the lunatic, the lover, and the poet," as of imagination all compact, and on whom it plays such tricks,

> That if it would but apprehend some joy,
> It comprehends some bringer of that joy.

Ever on the alert against enemies, man's fancy multiplied them on all sides, and since he naturally attributed passions like his own to the unseen beings in whom he believed, he dreaded "some bringer of that" harm from every quarter. The sun might shine, and the moon brighten the gloom of night, but these were fitful in their coming and their going, the black cloud-monsters swallowed them, and in the wake of storm and lightning, dragons of the fire and the wind, there followed destruction and death. Hence the prominence of devil worship, of belief in baleful powers amongst the lower races, and the averting of their wrath by

* Let me commend to careful study the chapter on "The Cultivation of Human Nature" in Mr. Cotter Morison's recently published "Service of Man."

† "Romola," p. 450.

sacrifices; hence, also, the persistence of like beliefs amongst the illiterate in civilised countries.

This animism, or general doctrine of spiritual agents, was largely fostered by personal experience supplied by dreams about both the dead and living, hallucinations, swoons, and by the shadows or reflections which objects cast, all which seemed to witness to the existence of a second self or soul, that came and went at pleasure during life, and haunted its old spots after death. The burial-place became the spot where the living brought their gifts to the dread spirits of the departed, whose worship is a leading feature of barbaric religions. Combined with the belief in life wherever power or movement were manifest, these elements have built up all theologies from the polytheistic to the so-called monotheistic, the common element in each being the ascription of personality to unseen powers. Given the intellectual stage which a people has reached, the character of their gods can be predicted, although the higher theologies will retain persistent traces of the barbaric conceptions of deity in which they arose. They are not, as shallow carpers have argued, the ingenious inventions of self-seeking men; they arise out of the necessity of human nature to frame an explanation of that which affects it deeply and constantly. Their roots draw nutriment from a common soil; the frenzy of the savage and the ecstasy of the saint have a common base in undisciplined imagination.

Theology is only purified from gross conceptions in the degree that it is purged of the false science with which, to its own hurt, it identified itself in the past, and to the remnants of which it still clings. The function of science is to clarify the mind and to show how the beliefs of the past are the myths of the present; the duty of theology is to readjust itself to what science proves to be true. Creeds may die, rites and ceremonies become matters of archæological interest, but human needs endure. Conduct is everything, because duty never lapses. Theology, uncorrected, troubles itself about the fate of a man who denies its speculative doctrines; morals bid him remember, as the one thing needful, that what he sows he or his will reap.

In the papers now brought to an end a vast field, the limits of which shade into the unlimited on all sides, has been roughly surveyed. We began with the primitive nebula, we end with the highest forms of consciousness; the story of creation is shown to be the unbroken record of the evolution of gas into genius.

Let us epitomise what, after all, is itself but a summary of a large subject:—

I. *Description.*—The universe is made up of Matter and Power, both of which are indestructible. Matter contains about seventy so-called elementary substances, which exist in a free or combined state as solid, liquid, or gaseous; it is also present throughout space in the imponderable state known as ethereal. The motions of Matter are due to Power, which acts in a twofold and opposite way, viz., as a pulling or combining Force, and as a pushing or separating Energy. Force inheres in matter, and acts continuously whatever the distance; Energy is both passive or stored up, and active or in a state of transfer from body to body, the sum-total being in gradual course of transfer to the ethereal medium, where its power to do work ends. Ponderable matter is distributed throughout space in bodies of various size and density, from molecules to sidereal or solar systems. Such a system is our central sun, with his company of planets and their moons and of comets and other wandering bodies. The planet on which we live is a nearly spherical body, three-fourths of which is covered by water, and the whole surface enveloped by an atmosphere. So far as its rind or crust can be examined, it is found to consist of solid rocks, the lowest of which have been fused by fire, and the uppermost laid down by water. The water-laid rocks contain the remains of plants and animals which have escaped the general destruction of organisms in the wear and tear which the rocks undergo ceaselessly. The simplest fossils are found in the oldest deposits, the more advanced in the newer, and so on in ascending scale until we reach the newest deposits, which contain the highest forms (see Table, KNOWLEDGE, vol. ix. p. 174). The existing species of plants and animals comprise the lowest and simplest, which have persisted throughout the life-period, and the highest, the vast majority of intermediate species having died out. All plants and animals are made of the same materials and have to do the same work. That work is threefold: to feed, to multiply their kind, and to respond to the outer world. The cells of which every part of every plant and animal is built up are variously altered and arranged according to the way in which that work is more or less divided amongst the several parts. The main difference between plant and animal is in the mode of feeding; the plant is alone able, in virtue of its chlorophyll, to convert the inorganic into the organic, and the animal therefore depends on the plant for its food supply.

II. *Explanation.*—At the beginning of the present universe matter was a diffused vaporous mass, unequally distributed throughout space. Force, acting on the unstableness of that mass, drew its particles together, and the resulting collision set free the stored-up energy, which became active in two forms: the *molar*, causing the several masses into which the particles had gathered to spin round in an orbit, and the *molecular*, causing a swinglike motion among the particles, which motion was converted into light and heat. The masses into which the primitive nebula was broken up became sidereal or solar systems, each of which, like the parent mass, threw off, as it was indrawn towards its common centre of gravity, masses which became the planets, from which were detached, in like manner, masses which became moons. Comets and other fugitive bodies are probably due to expulsion. Both in its shape and general condition the earth gives proof of this passage from the gaseous to the solid state. As one of the smaller bodies, it long ago ceased to shine by its own light, but a vast period elapsed before it became cool enough to form a crust and condense the vapours that swathed it into primeval oceans. The simplest compounds of its elements were formed first, the combinations becoming more and more complex until they reached that subtile form which is the physical basis of life, and which, starting as a structureless jelly, has reached its fullest development in man. The organic is dependent upon the inorganic, and mind, as a special form of life, takes its place as the highest product of the action of Power upon Matter. From the action of mind on mind has arisen that social evolution to which, in a supreme degree, is owing the progress of man in knowledge, whereby he has subdued the earth.

The ultimate passage of all energy to the ethereal medium involves the end of the existing state of things. But the ceaseless redistribution of matter, force-clasped and energy-riven, involves the beginning of another state of things. So the changes are rung on evolution and dissolution, on the birth and death of stellar systems—gas to solid, solid to gas, yet never quite the same—mighty rhythmic beats of which the earth's cycles, and the cradles and graves of her children, are minor rhythms.

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Thus the keynotes of Evolution are unity and continuity. All things are made of the same stuff differently mixed, bound by one force, stirred by one energy in divers forms. Force inheres in matter; Energy acts through it; therefore

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both have neither more nor less claim to objective reality than matter. And as science tends to the conclusion that all kinds of matter are modifications of one primal element, and that all modes of motion are varied operations of one power, perchance these three—Matter, Force, and Energy—are one.

But into these and like speculative topics Evolution does not intrude. Dealing with processes, and not with the nature of things in themselves, it is silent concerning any theories that may be formulated to gratify man's insatiate curiosity about the whence and whither. And since it can throw no light on the genesis of matter, or on the origination of motion, or on the beginnings of life or of mind, it leaves great and small alike a centre of impenetrable mystery. It may correct, yet it does not curb, the imagination; it has no shibboleths the surrender of which can awaken dread; its temper is not aggressive, it seeks to inform the life with the love of truth, and to let the facts which it reveals win their way on their own merits; since "a dogma learned is only a new error—the old one was perhaps as good; whereas a spirit communicated is a perpetual possession." Our sense of the beauty of nature is not dimmed by fuller and truer knowledge of her works and ways, while all that it really suffices us to know for the discharge of life's duties, and all the motive that is needed to impel us thereto, is supplied in the theory which has so profoundly and permanently affected every department of human thought.

Note.—After the needful revision incident to their serial issue, these papers will be published, with illustrations, in book form.

THE CIVIL WAR IN AMERICA.*

CONSIDERING that the fighting tendencies of man are among his least noble qualities, and are certainly those most obviously suggestive of his descent through savage ancestors from brute progenitors, there is something painfully suggestive in the tone in which the writer of the following matter glorifies the biggest but most senseless war the world has yet known. Had the North really fought, as has been pretended in the face of all the facts, to free the slave, and had that cause been as good as the liberty-loving Englishman is apt to believe, the whole of the South would have been degraded by their share in the war, and the United States could not have felt free of the shame thus falling on a most important section of the nation. As a mere matter of fact, however, the war only indirectly depended on the question of slavery, the differences really at issue being political, and, in the main, most unworthy of the sacrifices made on both sides during the four years of fighting. As for the slavery of the coloured people, there were, undoubtedly, shameful abuses in the system, and these North and South were alike bound in duty to remove. But no one who has ever lived among the coloured people can doubt for a moment that general emancipation came a great deal too soon. The race was and is utterly unfit for independence within any civilised community, however fully entitled to the freedom of savagery in the countries from which they were wrongfully stolen. Freeing them *en masse* was about as wise as turning loose all our domestic animals would be. Giving them the franchise was simply madness. Meant, however, as a deadly insult to the defeated Southerners, it has enabled them (showing in this characteristic cleverness) to get the dead weight of numbers they before wanted, the whole black vote going now (practically) with the former masters of the coloured race.

* The quoted matter is from the *Cincinnati Commercial Gazette*.

"Official returns show that about 2,653,000 soldiers enlisted during the war in response to the successive calls of President Lincoln, and that of this number 186,097 were coloured troops.

"Reports show that the Northern and Southern armies met in over two thousand skirmishes and battles. In 148 of these conflicts the loss on the Federal side was over 500 men, and in at least ten battles over 10,000 men were reported lost on each side. The appended table shows that the combined losses of the Federal and Confederate forces in killed, wounded, and missing in the following engagements were:—

"Shiloh, 24,000; Antietam, 18,000; Stone River, 22,000; Chickamauga, 33,000; McClellan's Peninsula campaign, 50,000; Grant's Peninsula campaign, 140,000; and Sherman's campaign, 80,000.

"Official statistics show that of the 2,653,000 men enlisted, there were killed in battle 44,238; died of wounds, 49,205; died of disease, 186,216; died of unknown causes, 24,184; total, 303,843. This includes only those whose death while in the army had been actually proved. To this number should be added, first, 26,000 men who are known to have died while in the hands of the enemy as prisoners of war, and many others in the same manner whose deaths are unrecorded; second, a fair percentage of the 205,794 men who are put down on the official reports as deserters and missing in action, for those who participated in the war know that men frequently disappear who, it was certain, had not deserted, yet could not be otherwise officially accounted for; third, thousands who are buried in private cemeteries all over the North who died while at home on furlough.

"The dead are buried in seventy-three National cemeteries, of which only twelve are in the Northern States. Amongst the principal ones in the North are Cypress Hill, with its 3,786 dead; Finn's Point, N.J., which contains the remains of 2,644 unknown dead; Gettysburg, Pa., with its 1,967 known and 1,608 unknown dead; Mound City, Ill., with 2,505 known and 2,721 unknown graves; Philadelphia, with 1,909 dead; and Woodlawn, Elmira, N.Y., with its 3,900 dead.

"In the South, near the scenes of terrible conflicts, are located the largest depositories of the slain:—Arlington, Va., 16,264, of which 4,319 are unknown; Beaufort, S.C., 9,241, of which 4,493 are unknown; Chalmettee, La., 12,511, of which 5,674 are unknown; Chattanooga, Tenn., 12,962, of which 4,963 are unknown; Fredericksburg, Va., 15,257, of which 12,770 are unknown; Jefferson Barracks, Mo., 11,490, of which 2,900 are unknown; Little Rock, Ark., 5,602, of which 2,337 are unknown; City Point, Va., 5,122, of which 1,374 are unknown; Marietta, Ga., 10,151, of which 2,963 are unknown; Memphis, Tenn., 13,997, of which 8,817 are unknown; Nashville, Tenn., 16,526, of which 4,700 are unknown; Poplar Grove, Va., 6,190, of which 4,001 are unknown; Richmond, V., 6,542, of which 5,700 are unknown; Salisbury, N.C., 12,126, of which 12,032 are unknown; Stone River, Tenn., 5,602, of which 288 are unknown; Vicksburg, Miss., 16,600, of which 12,704 are unknown; Antietam, Va., 4,671, of which 1,818 are unknown; Winchester, Va., 4,559, of which 2,365 are unknown.

"In all, the remains of 300,000 men who fought for the stars and stripes find guarded graves in our national cemeteries. Two cemeteries are mainly devoted to the men who perished in the prisons of the same name—Andersonville, Ga., which contains 13,714 graves, and Salisbury, with its 12,126 dead, among which 12,032 are unknown.

"Of the vast number who are interred in our national cemeteries, 275,000 sleep beneath the soil of the Southern

States, and 145,000 of these rest in graves marked unknown.

"The total Confederate loss will never be known, but the best estimates place it at about 220,000 men out of 1,000,000 men who served in the Southern armies. They fought during the war on the defensive, among friends, and generally under cover of breastworks of one kind or another, from rifle-pits to regular fortifications, which gave them an enormous advantage.

"The total number of men furnished to the Federal army by the United States during the war under all calls was 2,683,523. The total number of coloured troops in the Northern army was 123,156. The heaviest loss by disease was suffered by the coloured troops; while but 2,897 died in action and of wounds, the enormously large number of 26,301 died of disease. Among the white troops the proportion of deaths in action and from wounds to the deaths from disease was about 1 to 2; among the coloured troops as 1 to 8. Of the coloured troops enlisted, one out of every seven died of disease. The proportion among the white troops was 1 to 15.

"Now that we are brushing up these figures it will be well enough to remember how many men were furnished by each State, and the following list will show:—

Maine	71,745	Ohio	317,133
New Hampshire	34,605	Indiana	195,147
Vermont	35,256	Illinois	258,217
Massachusetts	151,785	Michigan	90,119
Rhode Island	24,711	Wisconsin	96,118
Connecticut	52,270	Minnesota	25,024
New York	455,568	Iowa	75,860
New Jersey	79,511	Missouri	108,778
Pennsylvania	366,326	Kentucky	78,546
Delaware	13,651	Kansas	20,097
Maryland	49,730		
West Virginia	30,003	Total	2,653,062
District of Columbia	16,872		

"Few of the great battles of history can compare in magnitude with the greatest battles of the Civil War, and the battles of that war were the bloodiest in all the history of wars in the proportion of killed to those engaged. Waterloo was one of the most desperate and bloody fields chronicled in European history, and yet Wellington's casualties were less than 12 per cent., his losses being 2,432 killed and 9,580 wounded out of over 75,000 men, while at Shiloh one side lost in killed and wounded 9,740 out of 34,000, while their opponents report their killed and wounded at 9,616, making the casualties about 30 per cent. At the great battle of Wagram, Napoleon lost but about 5 per cent. At Würzburg the French lost but 3½ per cent., and yet the army gave up the field and retreated to the Rhine.

"At Zurich, Massena lost but 8 per cent. At Malplaquet, Marlborough lost but 10 per cent., and at Ramillies the same intrepid commander lost but 6 per cent.

"At Contras, Henry of Navarre was reported as cut to pieces, yet his loss was less than 10 per cent. At Lodi, Napoleon lost 1¼ per cent. At Valmy, Frederick William lost but 3 per cent.; and at the great battles of Marengo and Austerlitz, sanguinary as they were, Napoleon lost an average of less than 14½ per cent. At Magenta and Solferino, in 1859, the average loss of both armies was less than 9 per cent. At Königgratz, in 1866, it was 6 per cent. At Werth, Spicheren, Mars la Tour, Gravelotte, and Sedan, in 1870, the average loss was 12 per cent., while at Linden General Moreau lost but 4 per cent. and the Archduke John lost but 7 per cent. in killed and wounded. Americans would scarcely call this a lively skirmish.

"At Perryville, Murfreesboro, Chickamauga, Atlanta, Gettysburg, Mission Ridge, the Wildernesses, and Spottsylvania, the loss frequently reached, and sometimes exceeded, 40 per cent., and the average of killed and wounded on one side or the other was over 30 per cent.

"Of the gentlemen who were at West Point during one period of a cadetship, fifty-six were killed in battle, and, estimating the rate of killed and wounded at one to five, 280 were wounded.

"From the discovery of America to 1861 in all wars with other nations the record gives the deaths in battle of but ten American generals, while from 1861 to 1865, both sides being opposed by Americans, more than 100 general officers fell while leading their columns. From 1492 to 1861 the killed and wounded upon American soil in all battles, combats, and skirmishes, added together, as shown by reports, hardly exceeded the casualties of single battles of the great American conflict."

SHAKESPEARE'S SONNETS.

I PROMISED some time back (or threatened—which is it?) to show from Shakespeare's sonnets that the special forms of knowledge traceable in the writer of the plays can be recognised in poems unquestionably by Shakespeare. I now propose to carry out this idea.

I take first the tokens of legal knowledge, or rather the use of legal terms and expressions so correctly that many lawyers have wondered how the country-bred Shakespeare could have obtained such command of legal language. Of course the wonder is not so great as many imagine. It is quite true that most of our best novelists blunder when they deal with legal matters, and especially when they try to use legal phraseology. But that is natural enough. The novelist is no more likely to have occasion, in his own experience, to study even the simplest legal questions, than other folk; and almost every reader of these lines who is not himself a lawyer knows how unapt he would be in the use of legal phraseology. But if any one not a lawyer has occasion, unfortunately for himself, to have dealings with lawyers, and if he has been careful to master all such legal statements as those dealings bring before him—then he will very soon acquire readiness and precision in the use of law terms, especially if he is observant and has a good memory. Now Shakespeare, owing to the many troubles in which his father was involved, had probably occasion to hear a great deal about legal matters; we can hardly suppose that a man of his power (judging only by the poems) would let these matters pass unnoticed. His keenness of observation and insight into meanings would enable him very quickly to learn all those details to which every sensible man who has dealings with the law must attend, and we have only to consider Shakespeare's amazing facility of expression to know that none could be quicker than he would be in seizing the meaning of new terms and phrases, and turning them into account in his poetry.

The trouble in this matter lies in the selection, so numerous throughout the sonnets are the legal terms and phrases. They come in sometimes casually, but not less significantly from the beginning. Thus, after touching in the first three sonnets on heirship, succession, posterity, and so forth, in the fourth sonnet Shakespeare deals with these and associated ideas in terms which might be objected to by an overwise critic as unduly technical. "Unthrifty loveliness," he says,—

> . . . . . why dost thou spend
> Upon thyself thy beauty's *legacy*?
> Nature's *bequest* gives nothing, but doth lend,
> And being frank, she lends to those are free;

Then, beauteous niggard, why dost thou abuse
The bounteous *largess* given thee to give!
Profitless *usurer*, why dost thou use
So great a *sum* of *sums*, yet canst not live?
For, having *traffic* with thyself alone,
Thou of thyself thy sweet self doth deceive,
Then how, when nature calls thee to begone,
What acceptable *audit* canst thou leave?
Thy unus'd beauty must be tomb'd with thee,
Which, us'd, lives thy *executor* to be.

[Here also the words "us'd" and "unus'd" are used in their legal sense, as relating to the usance of money.]

So, again, only a little further on (and it is worth noticing that these earlier sonnets were written when Shakespeare was a very young man), we find the hope expressed that "beauty held in *lease*" may "find no *determination*":—

Then you were
Yourself again, after yourself's *decease*,
When your sweet *issue* your sweet form should bear.

And so, passing on, we find again and again the terms and phrases of law brought in so naturally and so correctly that one might be tempted to say that Shakespeare's vocabulary borrowed too much from legal phraseology, did one not notice that scarcely any other subject can be named from which he has not in like manner borrowed. But we also find sonnets in which not casually, but evidently of set purpose, legal imagery (if one may use such an expression) is employed throughout. Consider, for instance, the following (Sonnet 46), in which a case in equity is fairly tried, though for poetic convenience the trial is called first a "war":—

Mine eye and heart are at a mortal war,
How to divide the conquest of thy sight;
Mine eye my heart thy picture's right would *bar*,
My heart mine eye the *freedom* of that *right*.
My heart doth *plead* that thou in him dost lie—
(A closet never pierc'd with crystal eyes),
But the *defendant* doth that *plea* deny,
And says—in him the fair appearance lies.
To 'cide this *title* is *impanelled*
A *quest* of thoughts, all *tenants* to the heart,
And by their *verdict* is *determined*
The clear eye's *moiety* and the dear heart's *part*:
As thus—mine eye's *due* is thine outward part,
And my heart's *right* thine inward love of heart.

Sonnet 87 is still more strikingly legal in tone, and should be carefully studied by the believers in the Baconian theory of Shakespeare's plays, as showing them at least that if legal phraseology, correctly employed, proves Bacon the author of the plays, it proves Bacon to be the author of the sonnets also: and in that case the Baconians will have to explain what Bacon meant by saying in the sonnets (written when Bacon stood already before the world a model of sober manhood devoted to most dignified employment) that he had "made himself a motley to the view." The sonnet runs—

Farewell! thou art too dear for my *possessing*,
And like enough thou know'st thy *estimate*;
The *charter* of thy worth gives thee *releasing*;
My *bonds* in thee are all *determinate*.
For how do I hold thee but by thy *granting*?
And for that riches where is my deserving?
The cause of this fair gift in me is wanting,
And so my *patent* back again is *swerving*.
Thyself thou gav'st, thy own worth then not knowing,
Or me, to whom thou gav'st it, else mistaking:
So thy great gift, upon *misprision* growing,
Comes home again on better *judgment-making*.
Thus have I had thee, as a dream doth flatter,
In sleep a king, but waking, no such matter.

In Sonnet 134 we not only note the use of many legal phrases, but we also seem to recognise some suggestion of unpleasant recollections of those home difficulties which, as we know, troubled Shakespeare's father. It runs:—

So now have I confessed that he is thine,
And I myself am *mortgaged* for thy will,
Myself I'll *forfeit*, so that other mine
Thou wilt *restore*, to be my comfort still;
But thou wilt not, nor he will not be free,
For thou art covetous and he is kind;
He learn'd but *surety-like*, to *write* for me,
Under that bond that him as fast doth bind,
The *statute* of thy beauty thou wilt *take*,
Thou *usurer*, that put'st forth all to *use*,
And *sue* a friend came *debtor* for my sake,
So him I lose through my unkind abuse.
Him have I lost: thou hast both him and me;
He pays the whole, and yet am I not free.

Surely, by the way, no one but Shakespeare could successfully have brought into poetry such legal expressions as "underwriting a bond," "taking benefit of the statute," to say nothing of such legal terms as "mortgaged," "forfeit," and "surety," here, and elsewhere in the sonnets, "debarred," "separable," "arrest,"* "bail," "vassalage," and the like. To Shakespeare even law, medicine, and chemistry had their poetical aspects. He who could find "tongues in the trees, books in the running brooks, and sermons in stones," could find also "good in everything."

We may conveniently turn next to those chemical touches in the plays which (because Lord Bacon dealt with chemistry) have been regarded as suggesting that Shakespeare was the great Lord Chancellor's *alter ego*. Chemical terms are as freely used as legal ones in the sonnets. In sonnets five and six we have a striking example, because a chemical process not seemingly poetical in itself is made poetically useful in most ingenious fashion. The poet, after speaking of beauty's winter, goes on to say:—

Then were not summer's *distillation* left,
A liquid prisoner pent in walls of glass,
Beauty's effect with beauty were bereft,
Nor it nor no remembrance what it was.
But flowers distill'd, though they with winter meet,
Leese but their show, their substance still lives sweet,
Then let not winter's ragged hand deface
In thee thy summer, ere thou be distilled;
Make sweet some phial; treasure thou some place
With beauty's treasure, ere it be self-killed.

Of the astronomy and astrology of his day Shakespeare evidently had what was considered ample knowledge—the Shakespeare of the sonnets had certainly the same ideas on these subjects as the Shakespeare of the plays, though it may here be frankly admitted that Bacon knew more than either, especially in regard to technical terms. In Sonnet 14, Shakespeare says:—

Not from the stars do I my judgment pluck;
And yet methinks I have astronomy,
But not to tell of good or evil luck,
Of plagues, of dearths, or season's quality;
Nor can I fortune to brief minutes tell,
Pointing to each his thunder, rain, and wind,
Or say with princes if it shall go well,
By oft predict that I in heaven find.

It is evident Shakespeare rather doubted the trustworthiness of the Raphaels and Zadkiels of his day. Yet had he some faith in the influences of the heavenly bodies. For he writes in Sonnet 15:—

When I consider everything that grows
Holds in perfection but a little moment,
That this huge state presenteth naught but shows
Whereon the stars in secret influence comment.

* It has been objected by some one, I forget whom, that only a man of legal turn of mind would ever have made Hamlet say "this fell *sergeant*, Death, is strict in his *arrest*." But in Sonnet 79, Shakespeare, speaking of his own death, says:—

When that fell *arrest*
Without all *bail* shall carry me away.

In Sonnet 26, he expresses the hope that some good conceit of the person addressed (whoever he may have been), may bestow the poet's duty in his soul's thought (whatever that may mean)—

> Till whatsoever star that guides my moving,
> Points on me graciously with fair aspect.

In the preceding sonnet he had spoken of "those who are in favour with their stars." Throughout, as throughout the plays, there is a general yet half-doubting acceptance of astrological ideas, but nowhere any reference to such ideas as Bacon advanced in what he called a system of rational astrology.

Among references to painting, I note especially those in Sonnet 24 :—

> Mine eye hath play'd the painter, and hath stell'd
> Thy beauty's form in *table* of my heart;
> My body is the *frame* wherein 't is held,
> And *perspective* it is best painter's art
> And through the painter must you see his skill.

(The play on words here is very curious—you are to see through the painter the painter's skill, because perspective or through-seeing is the best art of the painter) :—

> To find where your true *image* pictured lies,
> Which in my bosom's *shop* is *hanging* still,
> That hath his windows *glazed* with thine eyes.
> Now see what good turn eyes for eyes have done;
> Mine eyes have drawn thy shape, and thine for me
> Are windows to my breast, where-through the sun
> Delights to peep, to gaze therein on thee;
> Yet eyes this cunning want to grace their art,
> They draw but what they see, know not the heart.

This artificial style is certainly not Shakespeare's best, and is found only in the earlier plays. Yet in "King John" we find a passage which may be compared with Sonnet 24, where Lewis says of Blanche :—

> In her eye I find
> A wonder or a wondrous miracle,
> The shadow of myself formed in her eye;
> Which being but the shadow of your son,
> Becomes a sun and makes your son a shadow;
> I do protest I never lov'd myself
> Till now infixed I beheld myself
> Drawn in the flattering table of her eye.

It is to be noted, however, that Shakespeare *means* this to be taken as poor nonsense; for Falconbridge forthwith, with hearty scorn, laughs it all to the winds. Echoing the Dauphin's folly, he says :—

> Drawn in the flattering table of her eye,
> Hang'd in the frowning wrinkle of her brow;
> And quarter'd in her heart! he doth espy
> Himself love's traitor; this is pity now,
> That hang'd and drawn and quarter'd there should be
> In such a love so vile a lout as he.

How prettily, in Sonnet 128, Shakespeare brings music to his aid in appealing to his mistress for her love :—

> How oft, when thou my music play'st,
> Upon that blessed wood whose motion sounds
> With thy sweet fingers when thou gently sway'st
> The wiry concord that mine ear confounds,
> Do I envy those *jacks* that nimbly leap
> To kiss the tender inward of thine hand,
> Whilst my poor lips that should that harvest reap,
> At the wood's boldness by thee blushing stand!
> To be so tickled, they would change their state
> And situation with those dancing chips,
> O'er whom thy fingers walk with gentle gait,
> Making dead wood more bless'd than living lips.
> Since saucy jacks so happy are in this,
> Give them thy fingers, me thy lips to kiss.

I have not space to quote or even to mention Shakespeare's repeated references throughout the sonnets to flower and field, sowing and reaping, summer and winter, and the ways and works of those who till the soil. But I would specially recommend Sonnets 98 and 99 to those who, having noted how such matters are dealt with in the plays, and that Bacon, after his colder manner, knew much and thought much of flowers and gardens, fondly imagine that Bacon therefore wrote the plays. They run thus :—

> From you have I been absent in the spring,
> When proud-pied April, dress'd in all his trim,
> Hath put a spirit of youth in everything,
> That heavy Saturn laugh'd and leap'd with him.
> Yet nor the lays of birds, nor the sweet smell
> Of different flowers in odour and in hue,
> Could make me any summer's story tell,
> Or from their proud lap pluck them where they grew;
> Nor did I wonder at the lily's white,
> Nor praise the deep vermilion in the rose;
> They were but sweet, but figures of delight,
> Drawn after you, you pattern of all those.
> Yet seem'd it winter still, and, you away,
> As with your shadow I with these did play.
>
> The forward violet thus did I chide:
> Sweet thief, whence didst thou steal thy sweet that smells,
> If not from my love's breath? The purple pride,
> Which on thy soft cheek for complexion dwells,
> In my love's veins thou hast too grossly dy'd.
> The lily I condemned for thy hand,
> And buds of marjoram had stol'n thy hair;
> The roses fearfully on thorns did stand,
> One blushing shame, another white despair;
> A third, nor red nor white, had stol'n of both,
> And to his robbery, had annex'd thy breath;
> But, for his theft, in pride of all his growth,
> A vengeful canker eat him up to death.
> More flowers I noted, yet I none could see
> But sweet or colour it had stol'n from thee.

If the same poet wrote not these lines who conceived the exquisite poetry of Perdita's thoughts on flowers in "The Winter's Tale" (act iv. sc. 3), then can no poet—Homer or Virgil, Dante or Milton, Chaucer or Spenser, Goethe, Schiller, Corneille, or Hugo—be known by his style or power.

And now to show surely that Shakespeare wrote the sonnets, or that at least Francis Bacon did not (and no William Bacon has yet been suggested as the real Shakespeare), let the last lines of Sonnet 136 be quoted here at the last. It might be taken even as an appeal to the doubting Baconian :—

> Though in thy stores' account I one must be,
> For nothing hold me, so it please thee hold
> That nothing me, a something sweet to thee;
> *Make but my name thy love, and love that still,*
> *And then thou lovst me, for my name is* WILL.

THE MULLEIN TEST IN CONSUMPTION.—The success attending the treatment of consumption with mullein leaves by Dr. Quinlan, of Dublin, and which has been so widely published, has led him to make a formulated statement, showing briefly that in the earlier and pretubercular stage of pulmonary consumption, mullein has a weight-increasing and curative power greater than that of cod liver oil and equal to that of Russian koumiss; in cases where tubercles are well established or cavities exist, the mullein has great power in relieving cough; phthisical diarrhœa is completely obviated by the mullein; but it has no power or effect on the night-sweats of consumption, which are to be combated by atropia sulphate. Three ounces of the fresh green leaves, or about ten times as much of the dried, are boiled in a pint of fresh cow's milk, and after boiling a moment, the infusion is allowed to stand and "sipe" for ten minutes, when it is strained, sweetened and drunk while warm; this quantity is taken twice or three times a day. It is generally much relished by the patients, who regard it as a pleasant article of diet rather than as a medicine. The smoke of these leaves, inhaled into the respiratory passages, relieves irritation and spasmodic cough.

XUM

THE ONE-SCALE ATLAS.

MAP VII.

by Rich.d A. Proctor.

The linear scale radially is uniform throughout; the thwart scale is greater by 1/55th half way to the edge, and by 1/14th at the edge

Scale of Miles at centre of map, and radially all over map.

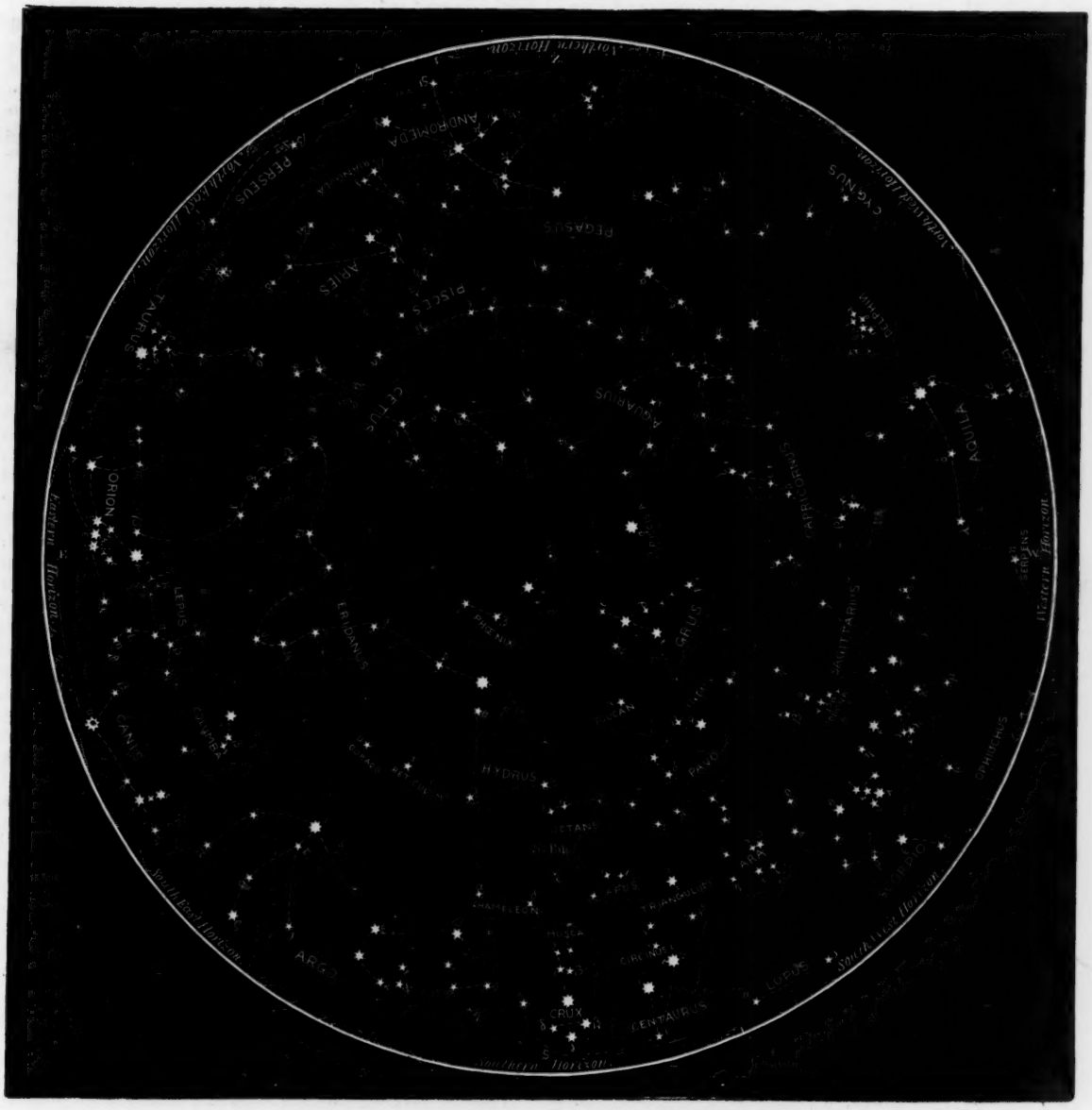
English Miles

Small areas are greater by 1/55th half way to the edge; and by 1/14th at the edge

Edw.d Weller, del

THE SOUTHERN SKIES.

MAP XI.—FOR AUGUST, SEPTEMBER, AND OCTOBER.



THE NIGHT SKIES IN THE SOUTHERN HEMISPHERE (LAT. 46° TO 24° S.)
AND THE
SOUTHERN SKIES IN ENGLAND (UPPER HALF OF MAP ONLY) AT THE FOLLOWING TIMES:

At 1 o'clock, morning, Sept. 6.	At 11 o'clock, night, Oct. 7.	At 9 o'clock, night, Nov. 7.
„ 12.30 „ „ Sept. 14.	„ 10.30 „ „ Oct. 15.	„ 8.30 „ „ Nov. 14.
„ Midnight, Sept. 21.	„ 10 „ „ Oct. 22.	„ 8 „ „ Nov. 22.
„ 11.30 o'clock, night, Sept. 29.	„ 9.30 „ „ Oct. 30.	„ 7.30 „ „ Nov. 30.

STAR MAGNITUDES.

First . . . . ✱ Second . . . . ✱ Third . . . . ★ Fourth . . . . + Fifth . . . . ▲

A "PERFECT INNINGS" AT CRICKET: A CHANCE PROBLEM.

DURING the cricket season of 1886 there occurred what has been called a "perfect innings,"* every player on the side scoring double figures, while the extras supplied a twelfth double-figure entry. Not one of the players reached the century, so that when the score of the innings was printed, the numbers opposite the names of the players made a neat double-figure column. This has not happened half a dozen times since cricket has been a game. Moreover, the score as actually formed was unique: for every item was above 15 (only one was below 20), and that has never happened before.

In the *Times* there appeared, a few days after this remarkable game between the Australians and an English eleven, a letter in which the exceptional nature of the innings was commented on, and a comparison was drawn between the occurrence of such an innings at cricket and the occurrence of what is called a Yarborough hand (or simply a "Yarborough") at whist. It happened that in the pages of KNOWLEDGE, about half a year before, both these unusual events had been considered, though no comparison had been instituted between them; and the writer of the letter in the *Times* touched on the circumstance that the kind of innings which had been described in KNOWLEDGE as altogether unusual should have presented itself within so short a time. He expressed also the opinion that it must be more unusual than a Yarborough, a point about which there can be no manner of doubt.

At first there seems to be no resemblance between the chance of a "perfect innings" at cricket and that of a Yarborough hand at whist; but, in reality, they both belong to the same class of questions in probabilities.

A Yarborough hand at whist is one in which there is no card above a nine—in whist estimation, according to which the ace is very much above the nine. The hand is called a Yarborough, because early in the century Lord Yarborough, a sporting peer, was in the habit of offering odds of a thousand to one (generally in guineas) that the deal would not give the person with whom he wagered a hand of this objectionable kind. Observe, we say, "the person with whom he wagered." Often the wager is wrongly described, as if Lord Yarborough betted against the deal giving a Yarborough to any of the four players. Had this been the wager, Lord Yarborough would have lost money over his venture; as it was, the story runs that he gained considerably, and it is certain that if he only laid the odds often enough he must have gained.

Now at first nothing can seem more absurd than a comparison between an innings at cricket and a deal at whist. But if we consider the two chances compared above, we shall find that they are much more nearly akin than would at first seem possible. In fact they only differ in kind in this, that the chance of a cricketer making double figures in a given match depends on our estimate of his skill and of the skill of the side against which he contends at the wickets, while the chance of any card dealt to a given player being below a nine is definite. Apart from this, the resemblance between the two chances in their nature is rather remarkable.

Let us consider them separately, avoiding all that is complex or otherwise unsuited to these pages. After all, this need not make our study of the subject incomplete; for all who know enough of the science of probabilities to follow complex or technical statements can supply from their own knowledge what we here omit, while to those who cannot all such statements would be unintelligible.

Suppose we are watching a deal at whist, all the hands being dealt in the usual way, except the hand of the person with whom the wager has been made that he will not get a Yarborough. His hand, let us suppose, is dealt face upwards, as in single-dummy whist. Of the thirteen cards in each suit eight fulfil the conditions of the wager, so that there are 32 cards in the pack any one of which will do for the first card dealt to this up-turned hand. The chance, then, that at the first round the bettor will not get an ace, king, queen, knave, or ten is clearly 32 in 52, which we represent as a fraction. Supposing the first round favourable, there remain 31 cards any one of which will suit, out of 51 unknown cards. The fact that three other cards have been already dealt, face down, in no sense affects the chance of success at this second round: all we have to consider is that a card has to be dealt which may be any one of the 51 unknown or undisclosed cards. For this round, then, the chance of success is 31 in 51, which again we represent as a fraction. The chance for the third round is 30 in 50; for the fourth, 29 in 49; and so on till we come to the thirteenth round, for which—always supposing that all the preceding rounds have been favourable for the player's wager—the chance will be 20 in 40, or exactly one-half.

Now, it is a well-known rule in probabilities that to find the chance of a series of events coming off in the way above imagined, we must multiply together the chances of the several events of the series. Thus, the chance of head being tossed at a single trial being one-half, the chance of tossing head twice in two trials is half of half, or a fourth; the chance of tossing heads thrice in three trials is half a fourth, or an eighth; and so on as far as we please, till (for example) we find the chance of tossing head twenty times in twenty trials to be less than one-millionth. Applying this rule to the Yarborough wager, we find the chance of a Yarborough hand represented by a fraction whose numerator is obtained by multiplying together the thirteen numbers from 20 to 32, both inclusive, while its denominator is obtained by multiplying together the thirteen numbers from 40 to 52, both inclusive. If the reader cares to carry out this multiplication (first, however, striking out all that is common to both series), and then to divide the large denominator he will get by the smaller (though still considerable) numerator, he will get the fraction 1 divided by 1,828 and something over.

It follows that at any given deal a player at whist has rather less than one chance in 1,828 of that kind of hand in which every lover of whist delights so greatly—a hand in which there is no card above a nine. The odds against this pleasing result are therefore rather more than 1,827 to 1;

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* The innings in question is worth quoting. It was played by an Eleven of England at Scarborough, September 4, 1886, and is not only remarkable as a "perfect innings," but also as the highest innings ever played against an Australian eleven. It was as follows:—

ENGLAND.

W. G. Grace c Jarvis b Giffen	92	Flowers c M'Ilwraith b Garrett	82
Scotton c Palmer b Trumble	71	Briggs c Jarvis b Garrett	21
Bates c Bruce b Spofforth	53	E. F. S. Tylecote c Palmer b Giffen	31
Barnes c and b Garrett	45	W. E. W. Collins not out	56
Barlow b Palmer	16	Extras	21
Ulyett b Palmer	48		
C. I. Thornton st Jarvis b Palmer	22	Total	558

The play of the Australians in the unfinished match was as follows:—

AUSTRALIANS.

G. E. Palmer c Briggs b Barnes	22	T. W. Garrett c Ulyett b Briggs	1
S. P. Jones c Tylecote b Barlow	24	J. M'Ilwraith b Barnes	4
G. Giffen c Thornton b Barnes	18	H. J. H. Scott not out	8
G. J. Bonnor retired hurt	46	F. R. Spofforth b Briggs	31
J. W. Trumble b Flowers	24	Extras	12
A. H. Jarvis b Briggs	18		
W. Bruce c Briggs b Barnes	23	Total	231

SECOND INNINGS.—G. E Palmer st Tylecote b Briggs, 75; S. P. Jones not out, 108; G. Giffen not out, 7; extras, 2; total, 192.

and in offering only 1,000 to 1 Lord Yarborough was acting (unintentionally no doubt) like those judicious but dishonest bookmakers who offer the young verdants of the turf 10 to 1 against a horse, when the true odds are nearer 20 to 1—or otherwise shorten the true odds against the horses in a race, making themselves safe on every race, though one or two of their victims win largely for the nonce, and so more surely become their prey, and induce others to fall into the same net. If we imagine 18,280 wagers on the Yarborough plan, about ten would result in loss to the peer; and the winners, as they pocketed severally their thousand pounds, would be apt to think "What a fool his lordship must be!" while bystanders witnessing the transaction would pity his folly, and repeat to themselves the good old proverb which indicates the swift separation of the unwise and his property. But the loss of ten thousand pounds or so (for, of course, there might be two or three more Yarboroughs, or two or three less, than the exact average) would be more than compensated, so far as the hereditary legislator was concerned, by the sum of 18,270*l.* which he would have pocketed during the proceedings. He would probably have secured a profit of 8,270*l.*; he would be practically certain to have secured a profit of at least 4,270*l.*, and his risk of not securing the full average profit of 8,270*l.* would be balanced by his chance of securing three or four thousands more than that amount.

Such are the conditions and chances in the matter of the notorious Yarborough wagers, which in these days of purity are no longer possible—our tempters of fortune having found more speedy ways of ruining themselves in "cover" speculation and the like.

Now consider the conditions and chances in regard to a "perfect innings" at cricket.

Here we no longer have definite chances to deal with. Yet, if we consider a given cricketer playing against a given eleven, it must be admitted by all who know anything of cricket, even with all the glorious chances of the game, that a fair estimate can be formed of the chance that he will get into double figures. In the first place, his batting average for previous seasons is known. How far during the actual season he is playing up to his usual standard is also known. The strength of the bowlers and fielders playing against him can in like manner be estimated, and the state of the ground and of the weather are also given conditions of the problem. A good cricketer in such circumstances would not hesitate long in forming an opinion as to the chance that such and such a player going in under such and such conditions to meet such and such an eleven would reach double figures. For instance, if Mr. Grace, or Mr. A. G. Steel, or either of the Reads—amateur or professional—were going to the wicket early in a game against a first-class county eleven, we know that any cricketer would regard the chance of the player making double figures, the ground being in good condition and the weather favourable, as considerably more than one-half, more even than two-thirds or three-quarters. On the other hand, when a player remarkable rather as a bowler or a wicket-keeper than as a bat goes in, late in the game, against the same eleven, we know that the chance of his making double figures is much less than one-half, and may even be less than one-tenth or one-twentieth. Of course, the event in either case may upset all such anticipations. A Grace may be out at the first ball, and a Shaw or a Sherwin, the pride of his eleven because of marvellous skill with the ball or over the bails, may go in last and pile up thirty or forty runs, to the disgust of the opposing eleven, which had regarded the innings of their opponents as already over. But the estimated chance was none the less correct.

Now it so chances that just as there are thirteen chances to be considered in the case of a Yarborough hand at whist, one chance for each card, so are there thirteen chances to be considered in the case of a perfect innings of cricket, viz., one for each player of the eleven, one for the extras, and one for the "not out" man. This last chance must clearly be considered as distinct from the several chances of the eleven. One man must carry out his bat: we cannot tell who may be the man, but whoever it may be, he clearly will have had two chances to contend against; first, the chance against his making his double figure before yielding to the enemy's attack, and secondly, the chance that the last of the wickets will fall, though he maintain his own defence, before he has attained double figures. We may fairly regard this extra chance as equal to the average chance of a member of the eleven getting into double figures, since the "not out" man may be any one of the eleven.

In the case of any given innings then, to be played by eleven men of known skill against an eleven whose bowling and fielding abilities are also known, we have in effect, as in the Yarborough problem, a series of thirteen known chances to consider, each one of which must turn out favourably that the innings may be a "perfect" one. We set down our estimate of the chance in the case of each man that he will pass the nine and so enter among the double-figure men. We take the average of these eleven fractions as the chance that the "not out" will have made his double figures before the tenth wicket has fallen. And lastly we get a thirteenth fraction to represent the chance that the extras will run into double figures by considering what are the chances in regard to the innings to be made by the eleven as a whole, and what proportion the extras are likely to bear to the total innings. Thus, as in the Yarborough problem, we have thirteen fractions representing the series of chances, all of which must turn out favourably, if the innings is to be "perfect," and, multiplying them all together, we obtain the chance of that event.

Of course for each match played the calculation of the chance of a perfect innings would be different. If players of the strongest defensive force form the eleven, even the bowlers being great batsmen, like Steel (A. G.), Studd (C. T.), Ulyett, Emmett, and the champion himself, the chances of a perfect innings are much less than where an eleven, as usual, divides its strength more definitely between batting and bowling, and includes a man or two selected for skill rather in saving than in making runs, or for such quickness as makes a good wicket-keeper so destructive, or a keen point or short-slip so effective both in saving runs and catching out players. Then the qualities of the opposing eleven have to be considered. They may be such that even an eleven of the most effective batsmen may be compelled to play a defensive game, insomuch that though that game may prove a winning one, it is not likely to run into high figures.

All one can do in each case is to consider, according to the best evidence available, what chance this player has or that of making not fewer than ten runs against the opposing eleven, and then combining the chances by multiplying, as already explained. Thus one might put down the chance of the first players, A and B, as one in two, and of the remaining nine players in order as one in three, three, four, four, five, five, six, ten, ten; the chance for the not out, whoever he may turn out to be, might be put at one in twenty, and the chance of a double figure for extras at one in two. Then the chance of a perfect innings would be represented by one in the product of the thirteen numbers—two, two, two, three, three, four, four, five, five, six, ten, ten, and twenty. This product will be the product of the numbers 20, 20, 20, 20, 20, and 108, or 345,600,000, so that the odds would be 345,599,999 to 1 against a perfect

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innings. But, on the other hand, the eleven might be so strong, and opposed to such moderate bowling strength, that the chances for the 11 players, the not-out chance, and the chance for extras, might be represented by 5 in 6, 4 in 5, 2 in 3, 2 in 3, 5 in 8, 3 in 5, 3 in 5, 1 in 2, 1 in 2, 1 in 3, and 1 in 4, for the eleven players; 3 in 8 for the "not out"; and 4 in 5 for the extras. Then the chance of a perfect innings would be represented by a fraction whose numerator would be the product of the numbers 5, 4, 2, 2, 5, 3, 3, 1, 1, 1, 1, 3, and 4, while its denominator would be the product of the numbers 6, 5, 3, 3, 8, 5, 5, 2, 2, 3, 4, 8, and 5—which is evidently 1 in 2,400 (all the first set of numbers cancelling against numbers or parts of numbers in the second set).

It must be quite common for the chance of a perfect innings to be less than one in a million, so that in a match of four innings it would quite commonly happen that the chance of a perfect innings would be less than one in a quarter of a million.* Often the chance of a perfect innings in a match is less than one in several millions. Very seldom, indeed, can the chance of a perfect innings be so large as one in 4,000 for an innings, or one in 1,000 for the match. It always seemed to me about as likely as this that during some of the matches played against the Australians a perfect innings would come off, because the Australian eleven has had bowlers and a wicket-keeper who might be safely trusted to make a good average also with the bat, and when England had to select elevens to meet them, it was desirable (especially during their first three visits) to select bowlers of the same quality. At the wicket, Mr. Tylecote among amateurs and Pilling among professionals could always be expected to make a good score with the bat, and, although Sherwin is in that respect not their equal, yet it has more than once happened that he has got into double figures even against the powerful attack of the Australian eleven in 1884 and preceding years. As for bowlers, though it is customary to say that the Australians are ahead of us in the combination of bowling and batting strength, I cannot think that any five among all the Australian teams would in this respect surpass Messrs. W. G. Grace, A. G. Steel, C. T. Studd from among our amateurs, and Ulyett and Emmett from among professionals, while to these five ten more might be added, of scarcely inferior quality, from the elevens of Nottingham, Yorkshire, Lancashire, Surrey, Gloucester, Kent, and Sussex. With elevens made up so as to have no "tail," the chance of a perfect innings is greatly increased. Yet I should imagine that no two elevens have ever met whose chance of giving, in the match, one perfect innings has been equal to much more than one in a thousand. Such encounters, also, are so few and far between that the small chance in any given match is not made up by the number of trials. Taking all the cricket matches played year after year, and a fair computation of the average chance of a perfect innings in a match at not more than 1 in 100,000, we cannot wonder if season after season passes without a perfect innings being recorded. For, counting thirty weeks in the cricket season, and supposing twenty matches going on daily of the kind which we are considering, each lasting three days, we only get 1,200 encounters in the year, so that there might be expected one perfect innings in rather more than eighty-three years!

So far as I can learn there have not been more than two or three perfect innings before that of last year, and there has never before been a case in which every item of the score exceeded fifteen.

* Although four innings are not played in every match, we may fairly set against the chance of four full innings not being required the chance that when this happens one innings on the winning side will be exceptionally large. Manifestly (for example) if one side is beaten in a single innings, there is more likelihood of that innings being a perfect one than if four innings, all perhaps of nearly equal value, were played out.

CURVES IN BASE-BALL PLAY.*

THE great curves, as recently photographed, are shown in fig. 1. In explaining these curves, E. J. Pringle says that the picture represents two kinds, an in-curve and an out-curve, and there are two methods for using each of them. One is to start the ball in a direct line for the home base and the curve will carry it to the left of the base. Another is to start the ball in a direct line for the batsman and let the ball curve over the plate. The latter curve, however, is

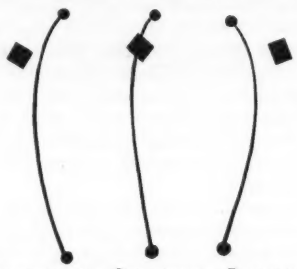

FIG. 1.—IN-CURVES AND OUT-CURVES PASSING THE HOME BASE (AS PHOTOGRAPHED).

not safe unless the pitcher has a good command of the ball. The in-curve is much the best, provided the pitcher is expert enough to use it.

The in-curve and out-curve are probably the easiest of the pitcher's curves, while the drop and the rise ball are the hardest. The different curves now in use were discovered by different persons, but all pitchers are now perfect in them.

Arthur Cummings was undoubtedly the first to discover the out-curve when he pitched for the Stars of Brooklyn back in 1869. It was then that he suddenly found that he could strike out batsmen when he pleased, and he also noticed the ball curve, but why, he did not know himself. He practised hard, and finally found that it was done by a certain curve of the wrist and the way the ball was held.

To throw the out-curve: The ball should be grasped firmly with the first two fingers of the right hand with the thumb on the opposite side and the other two fingers close in the palm of the hand. Use the underhand throw, and carry the hand forward midway between the shoulder and waist. When the ball is released the palm of the hand must be turned exactly upward, the first two fingers pointing as near straight as possible.

When the ball is thrown (fig. 2) it can be released either by drawing the thumb back or by turning it over to the right and allowing the ball to roll around the side of the forefinger, and not off the tip. A neat way of getting a grip on

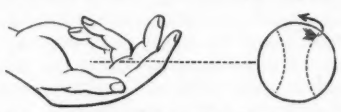

FIG. 2.—THROWING THE OUT-CURVE.

the ball is to catch the middle finger on the seam of the ball. By so doing one can cause the ball to rotate more

* From the *New York Sun*.

rapidly. These same movements are performed by a left-handed pitcher for an in-curve.

To throw a low in-curve the ball is held firmly with all the fingers and the thumb on the opposite side. A straight side motion is used, which brings the hand well out from the body and on a level with the shoulder. In this curve, when the ball is released, the palm of the hand is turned exactly towards the left, with the fingers sufficiently closed

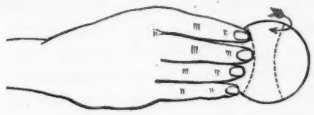

FIG. 3.—THROWING A LOW IN-CURVE.

around the ball to give it the required rapidity of rotary motion. The ball is released while the hand is in this position (fig. 3). This curve can be greatly improved by catching hold of the seam of the ball with the ends of the first three fingers before throwing it. This curve is, perhaps, the easiest one to acquire. Very often a beginner can throw a good in-curve the first time he tries.

In a high in-curve the hand passes above the head with an overhand motion.

The "Only" Nolan was probably the first pitcher to use the down-curve, and he met with remarkable success. In throwing a down-curve the ball is held in the same manner as for the in-curve. An underhand throw is generally used for this curve. When the ball is released, the hand is held

FIG. 4.—THROWING A DROP-CURVE.

pointing directly towards the home base, with the palm turned upward, allowing the ball to roll off the tips of the fingers (fig. 4). This curve is to-day one of the most deceptive in use on account of the inclination of the ball to drop anywhere but at the right place.

Radbourne is one of the successful men with the up-curve. The up-curve was introduced by McCormick of the Pittsburgs some years ago. This is the most difficult curve to pitch, and but few ever become perfect in it. Every one knows that the ball is likely to curve downward, and in order to overcome this downward tendency great swiftness must be used to get sufficient resistance from the atmosphere. In pitching an up-curve the ball is held in the same manner as for an out-curve. The hand is thrown forward and downward with a quick jerk. As the hand goes downward

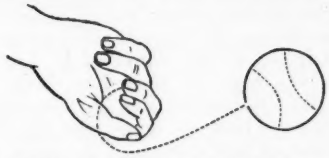

FIG. 5.—THROWING THE UP-CURVE.

it should pass the knee and go at least a foot to the front of it before the ball is released. Just as the ball is thrown the little finger edge of the hand will be turned upward, and the palm will be in such a position that the pitcher can look into it (fig. 5). The first two fingers will be nearly horizontal and pointing directly away from the pitcher. The ball is released from this position by allowing it to roll under the first finger, and assisting the progress by a twist of the thumb. The ball should roll off the side of the finger, and not off the tip.

These are by no means the only curves used by the pitchers nowadays. There are the out-rise, in-rise, out-drop, and in-drop, all in the nature of two curves. Then there are several different "shoots" used; they are in the nature of a quick curve.

Avory, the famous Yale pitcher, probably never curved the ball, yet he discovered the in-shoot. It is now no unusual thing to find a pitcher with all these points, and many more wrinkles that they keep working up. Change of pace was most beautifully illustrated by Al. Spalding in the old Boston champions. Tim Keefe of the New Yorks is now the most successful in that line, while Clarkson of the Chicagos is also working the change of pace to good advantage. Will White and John Ward were about the first to work the sharp curve and in-shoot as far back as 1878. One of the greatest pitchers that ever twirled a ball was Charlie Sweeney, who was with the Providence Club in 1883–84. He was the first and perhaps the only man who could curve an out-ball to a left-hand batsman. Several of the pitchers can get a shoot, but his was a clean curve.

Even with all these, curve-pitchers are not satisfied, nor will they be until they can pitch a ball that will stop in the air just before reaching the home-plate, and wait until the batsman has made a strike, and then pass on to the catcher.

In curving the ball in the wind, E. J. Prindle says:—"Throwing an out-curve from north to south curves the ball to the east. Now, if the wind is blowing from the east it will retard the curve, and it may, if very strong, entirely prevent it. In pitching from north to south, an east wind will assist an in-curve, a west wind will assist an out-curve, a south wind will assist any curve, and a north wind will retard any curve."

THE SUN'S INTERIOR.

IT is strange, but nevertheless true, that the study of our earth's crust has taught science something about the interior of the sun, or rather about what lies below the visible surface of the sun, which we call the photosphere. The evidence is not at present precise, but it is not difficult to see that along the line of evidence thus afforded a much greater approach to exactness can be made than has hitherto been obtained.

When the geologist examines the earth's crust, he finds evidence of the fast progress of changes such as are now in action, during millions, nay tens of millions of years. Thus, among the rock strata of the earth are to be found traces of the action of rain and water, wind and storm, alternate heat and cold. Among the fossilised remains found in these rocks are some which indicate the presence of forms of life which could only have existed where there were light and heat. Among all the strata, evidence is to be found of the action of changes such as are produced by solar action alone. Thus in the rocks of the earth we have evidence of past solar activity, and the means of determining how much work was done by the sun.

It matters nothing, so far as this inquiry is concerned, whether we consider the sun to have been more active or less active in the past than he is now, for it is the total amount of work he has done upon the earth which we have to consider, not the rate at which it was done.

Dr. Croll, of Glasgow, one of the most careful of our geological inquirers, finds evidence in the rock strata of Scotland showing that the amount of work done by the sun on the earth corresponds to at least 100,000,000 of years of

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sun-work, at the sun's present rate of emission of heat. The late Sir Charles Lyell, who carefully examined Croll's investigations, was satisfied that this estimate probably fell short of the truth rather than exceeded it.

But if there is one result which comes out clearly from modern physical inquiries, it is that the sun's emission of light and heat are due almost wholly to his gravitating power, to the might by which he has been drawn and is drawing in towards his centre the material now forming his globe. Some little extra energy may arise from the drawing in of matter external to his globe; but it can be but very little compared with that due to the mass already within the solar globe as we see it, and the contraction which this mass has still to undergo. Now, the force of contraction, if it is supposed to have acted to draw in matter originally at exceedingly great distances, until the whole mass has been brought within the compass of the sun's present globe, throughout which it is uniformly or nearly uniformly strewn, could not have corresponded to more than about 20,000,000 years' emission of heat and light at the sun's present rate of working. This would only correspond to about one-fifth part of the amount of work which—judging from the earth's crust—the sun has actually done.

How are we to explain the apparent discrepancy between the evidence given by the earth and that given by the sun? Very easily, according to Dr. Croll, though for my own part I find his explanation very difficult to accept. He thinks that a part, and a very large part, of the sun's heat may have been derived from the motion of masses originally non-luminous, rushing with enormous velocities through space. He says, quite truly, that if we are asked whence they derived those velocities, we are in reality no more called upon to reply than we should be if we were asked whence they derived their substance. But he seems to me to overlook the enormous improbability of collisions occurring between masses thus travelling about through inter-stellar space. To conceive that the stars we see, either with the unaided eye or the telescope, were originally formed by the conflict of bodies originally rushing darkling through space, is to conceive something as unlikely as that the bullets fired by two widely-scattered bodies of opposing skirmishers should be constantly encountering in mid-air—or rather, it is to suppose what would be far more unlikely.

Moreover, whatever heat might be generated by such collisions, were they possible in the required number, would be dissipated quickly, and long before any attendant orb like the earth could possibly have begun to be the abode of life.

It seems to me, then, that we are driven to a very different explanation—this, namely, that the process of contraction has gone on much farther than it seems to have done, and that consequently much more of the sun's work has already been accomplished than had been supposed. According to this view, the sun's real globe is very much smaller than the globe we see.

The knowledge thus obtained about the sun's interior has been derived from the crust of the earth.

But so soon as we have thus been led to recognise the remoteness of what we call the sun's surface (that is, the solar surface we see) from the real surface, other evidence towards the same view begins to present itself. Thus the marvellous motion of the solar spots, by which it has been shown that the equatorial zone of the sun gains one entire revolution in eight on the zone of spots farthest removed from the equator, would be impossible were the surface we see anywhere near the real surface. We are absolutely compelled by this amazing freedom of motion in the solar photosphere to admit that in all probability the real globe of the sun is very much smaller than the globe we seem to see, limited by the surface which happens to have that degree of brightness which prevents us alike from seeing below except where spots exist, or from seeing outer layers, except during the time of solar eclipse.

There is another proof of the condition of the sun's interior, which is more recondite and difficult. Professor G. H. Darwin (a son of the late Charles Darwin) has shown, by mathematical computations of the most convincing kind, that if the sun's visible globe were of anything like uniform density throughout there would be recognisable compression at the solar poles. Now, all the most careful observations of the sun agree in showing that if such compression exists at all, it is so slight as not to be discernible with the best telescopes yet made. It follows that the sun's globe must be greatly condensed towards the centre.

It is interesting to note that if the view to which we have been led is correct—and it is difficult to see how it can be otherwise—the sun has passed through a greater portion of his career as a light-emitting, heat-radiating, and consequently life-supporting orb, than has been supposed. In point of fact, the difference is so great as probably to reduce by more than three-fourths the estimate science makes of the length of time during which the sun will continue to supply adequately the heat and life necessary for our earth and the other worlds circling around him. Albeit, there is no reason to suppose that for many millions of years yet to come the supply will run short. Moreover, man is exhausting the life supplies of the earth herself at such a rate that what we now regard as civilised life upon the earth must die out millions of years before the solar emission of light and heat will probably be appreciably reduced.

This point, the wild waste of the earth's life stores, which, millions of years in accumulating, will be exhausted in a few thousand years at the outside, if the present ever-growing rate of consumption continue, will be considered next month.

Gossip.

MOST men, in looking back over their lives, recognise events which have seemed exceptionally lucky and others which have appeared the reverse. The whole bearing of my little treatise, "Chance and Luck," shows that I am no believer in luck which may be counted on; or, therefore, in luck worth considering at all. But there have been times when I have been specially fortunate. For example, that just when I had been scolded for holding persistently the solar theory of the corona, photography should come in and confirm all I had maintained, was singularly fortunate: for everyone understood *that* argument. So, when I had maintained the theory that nebulæ are parts of our galaxy, I could not hope that a new star would be seen to die out into a gaseous nebula (in Cygnus), that another new star would appear in the famous star-cloud in Andromeda, and that a new nebula would be detected by photography in the midst of the Pleiades, and clinging so manifestly to one of the stars there as to leave no doubt that the nebula really lies in the midst of the cluster. Yet, again, I was very lucky in that just when the Astronomer-Royal, admitting the exactness of all my calculations in regard to the recent transits of Venus, explained lustily that the stations I suggested could not be occupied, and, therefore, would not, American and other astronomers proclaimed that those stations could be occupied, and should be, and proved their case and mine by occupying them forthwith, and making excellent observations.

* * *

SUCH pieces of luck are not common even in a lifetime. Yet I consider myself even more exceptionally lucky in that my business took me to America in 1873–74, when the Tichborne trial was in progress, filling three-fourths of the space in our English newspapers, occupying nine-tenths of men's talk and attention.

* * *

I HAVE been luckier yet in that throughout all this Jubilee business I have been where the distant hum of it all scarce even reached men's ears.

* * *

IN these days no man can be an Admirable Crichton—assuming the actual Crichton was really so well informed in all the science of his day as men said. But if any man has a chance of taking even a bird's-eye view of the science of our time, or of its history during, say, the past half-century, it can only be a man who is thoroughly grounded in mathematics. The effect of trusting even the sketching of general science to men who are not mathematicians, however eminent they may be in special departments of research, must ever be disastrous. Of this truth the last few months have afforded more than one "awful example."

* * *

IT should be obvious, of course, that no man can appreciate the work done in our time in physics, astronomy, mechanics, and kindred departments of science, without being well versed in the general principles of mathematics. But, as Galton well pointed out when, in dealing with a subject seemingly biological, he found mathematical formulæ essential to successful inquiry, mathematics is "queen of the whole domain of science."

* * *

APART from the direct application of mathematics in nearly every department of science, the mathematical turn of mind is of important service even where no mathematics may be employed or required. To recognise the truth of this, one need only notice the failures which men not mathematically trained to close reasoning, nor by nature gifted with mathematical potentiality, almost invariably make in scientific researches of any difficulty. I know of no example of a continuous series of investigations, logically pursued to final success, by any man not mathematically minded. Darwin, Tyndall, and Spencer, who have done no independent mathematical work, have been pre-eminently mathematical in their manner of working and thinking. And some even who have objected to the too purely mathematical treatment of their special subjects have shown clearly that, had they not been great in such special work, they might have been eminent in mathematics.

* * *

I HAVE been asked by a correspondent in America what are "the curious phenomena of the instantaneous reversal of comets' tails on passing their perihelion," referred to in a recent article on the progress of science. I really am unable to say. A comet's tail is directed along the major axis of the orbit when the comet is in perihelion, and does not point in the reversed direction unless when the comet is in aphelion, when, however, a comet usually has *no* tail. I have never heard of the instantaneous reversal of a comet's tail either at or near perihelion. The only cases of quick reversal occur where a comet's perihelion is very near the sun, when it has happened (in perhaps half a dozen cases out of hundreds) that, in the course of a few hours, a comet's tail has been actually reversed, as the comet's head has passed, in that short time, from a position on one side of the sun to a position on the side exactly opposite. But the reversal does not take place at perihelion, but as the comet passes from one end to the other of the *latus rectum* of its orbit—a line *at right angles* to its direction from the sun when in perihelion. Nor is the reversal ever instantaneous. In the case of the great comet of 1811 the reversal was not completed in much less than a year. There is no other mystery in such reversal, whether slow or rapid, than there is in the general law that a comet's tail is turned always from the sun, of which these reversals are but special cases.

* * *

A CORRESPONDENT at Pernambuco asks me (or rather, I should say, asked me a long, long time ago) whether the right saying is "*De mortuis nil nisi bonum*," or "*De mortuis nil nisi bene*." I never had any classical knowledge worth speaking of, though I read my Homer, my Virgil, and my Horace, my Euripides and my Terence, with ever-growing pleasure and satisfaction—which, I find, is not always the case with those painstaking college friends of mine who could descant most learnedly on the force of κατά in composition, and like delectable details. Frankly, I have not the slightest idea where the expression which in England we render always *de mortuis nil nisi bonum* had its origin. If such origin is known, the question of the right form can probably be at once disposed of. Yet, after all, even this is doubtful. Every one knows that Virgil (or Vergil—which is it?) wrote *Facilis descensus Averni* or *Averno*; yet no one would pretend to aver that *Averni* or *Averno* is right, in face of the fact that while many excellent editions give one form, many not less excellent give the other—the old Delphin and the modern Oxford agreeing in *Averno*, which is the form I always employ myself.

* * *

MY Pernambuco correspondent, who is a naval officer (and whom I beg to thank for a highly interesting letter) writes that every German at his station gave *bene* as the right reading, every Englishman giving *bonum*. A German paper which was referred to on the subject thanked its correspondents for their trust in its Latinity, and explained that since the expression *De mortuis nil nisi bonum*, or *bene*, is short for *De mortuis nil nisi bonum vel bene dicitur*, or "Let nothing be said of the dead but," &c., *bene* the adverb *must* be preferable to *bonum* the adjective. To one who has no pretensions to Latinity, *dicitur*, as used by this classical authority, sounds appalling. In my ignorance I should have suggested *dicatur*. But be that as it may, I cannot but think his dogmatic decision open to question. In reading dear old Cicero I have come across the suggestion *Ut nihil præter verum diceretur bonum*; and Latin good enough for Cicero is good enough for me, however unsatisfactory it may seem to our classical German editor.

* * *

OF course all English readers remember Thackeray's Roundabout Paper "Nil Nisi Bonum," which settles the question of customary English usage.

* * *

SPEAKING of familiar Latin sayings and quotations, I frequently notice in English, American, and Continental papers the rendering (in their various vernaculars) "I fear Greeks and those who bring gifts," as conveying the idea expressed in the familiar "Timeo Danaos et dona ferentes." Laocoon, we may be sure, addressed no such feeble warning to his countrymen, when he closed his ardent address with the familiar words:—

Equo ne credite, Teucri.
Quidquid id est, timeo Danaos et dona ferentes.

Scan the line, and the stress falling on the *et*, as it closes the heavy spondee before *dona ferentes*, would of itself suffice to show that it means not merely "and," which in

that position would be inane, but "even" or "even though." The Greek *καί* had a similar force, as in the well-known line, Ἕκτορα, καὶ μεμαῶτα, μάχης σχήσεσθαι ὀΐω. What would be thought if this line were rendered "I will keep back Hector and one raging," instead of "Hector, even though (he be) raging"?

* * *

The lateness of my reply to my Pernambuco correspondent reminds me to remark here that I receive many letters at my distant home, on the banks of the Missouri, after they have made a roundabout journey through London, to which it seems idle to respond, so late as my answers would appear, especially if sent from St. Joseph at such a time as to reach Messrs. Spottiswoode just after a number was ready for the press. I appreciate, however, very much the kindly letters I constantly receive.

* * *

At St. Joseph, by the way, we have been having during the last week some rather trying weather. What would they think in England of a week during which the afternoon thermometer has shown each day over 100 degrees in the shade, while even in the night the temperature has scarcely once gone below 85 degrees? On one day the number of deaths from sunstroke (probably encouraged by whisky nips and unsuitable food) must have risen throughout the States to over a thousand, judging from the number officially recorded in the larger towns.

* * *

As one correspondent sends me a cutting from the *Pall Mall Gazette* describing a meteor seen at "St. Joseph, a village in Iowa," marking this passage as probably referring really to St. Joseph, Mo., I may as well point out that St. Joseph, Mo., is not a village but a large town, numbering 50,000 inhabitants, with a dozen banks, three dozen churches, several hotels, one of which is about half as large again as the Grand Hotel, Brighton, and railway communication by ten lines with surrounding regions, to which even as I write three new lines are being added. St. Joseph is placed as the second richest city in the United States, in proportion to its population, Portland, Oregon, being the first; and as the Clearing House records for the last half-year have indicated a constant advance on the corresponding weeks of last year by from 40 to 90 per cent., it may be inferred that St. Joseph is a thriving city. It has been considered rather old-fogeyish for some years past, most of its wealthier citizens having rather set their face against improvements. But a change has recently come over St. Joseph in this respect, and improvements are now in progress everywhere throughout its extent.

* * *

I suppose there must be a score of St. Josephs or more in the United States.

* * *

I often wonder at the novel experiences I encounter in lecturing, because after giving 2,000 lectures one would suppose there could hardly remain anything new to be met with. But my last lecture in America, given on July 4, a broiling hot day, at Lexington, Kentucky, brought me a stranger and more unpleasant experience than in nearly a score of years' lecturing I have ever encountered. I was to give two lectures for a semi-religious, quasi-scientific body, called the Chantangua Society, whose object seems to be to provide cheap lectures, Chinese lights, literary scrap-work, and holidays, profitable to promoters, all over the States. I might have suspected something of what was in store for me by the beggarly nature of the terms offered me. But I have had pleasant times in Old Kentuck, and notably in Lexington, so I elected to travel 1,400 miles and give a week's work for about a fourth of the fair price—(the labourer at 95 in the shade is worthy of his hire). The society, which cleared a large enough profit to buy the ground on which the entertainment was held, could not afford, it appeared, to hire my lanternist, nor to engage a lantern and lanternist in Lexington: but borrowed a lantern (I was, unfortunately, foolish enough to lend them mine), and undertook to work it by some capable volunteer. The lantern was sent on four days before I arrived, and at my cost. I supposed, of course, that the volunteers would try their hands at working it, according to printed instructions forwarded them. To make a long story short, I was met on arrival at the grounds just before the first lecture, with the appalling question, "What gases do you use for this lantern?" We used none, I need hardly say, *that* night, and I left Lexington till the next lecture, having given the secretary—a Professor (*sic*) W. D. Clintock—very clearly to understand that if his volunteers could not work my lantern, he must hire a properly trained lanternist. Will it be believed that on the night of the last lecture, three days later, they had not learned even how to fix the lenses? They broke the condenser by setting it too near the glowing lime, failed to get any disc on the screen, and, adding insult to injury, the Rev. Professor, otherwise the hopeless incapable to whom the fiasco was due, deliberately told the audience that as I had lent the lantern the fault was mine. Their applause after I had replied showed whom they believed, and I received immediately any number of assurances of sympathy from the best members of the community. But such experiences sicken even the veteran lecturer.

Reviews.

Industrial Ireland. By Robert Dennis. (London: John Murray. 1887.)—Amid the oceans of contradictory talk and reams of printed discussion with which the British nation has been so long afflicted, we can assert, quite unhesitatingly, that no contribution towards the solution of the *vexata quæstio* of Ireland equal in value to that of Mr. Dennis has so far appeared. To anyone who may feel disposed to regard such unqualified praise as partaking of the nature of hyperbole, we would simply give the advice to read the book for himself, and learn how, within the compass of 202 pages, its author shows in what way Ireland might really be made prosperous, and, as an immediate consequence, happy and contented. His remedy is no quack political panacea. He has no sympathy with the venal and unprincipled crew who, themselves living on the earnings of the cookmaids and hodmen in New York, foment agitation, lest its cessation should drive them themselves to the necessity of earning an honest living. He does not profess to believe (what honest man does?) that a Parliament of Healys, Harringtons, and Sextons on College Green would be the salvation of the country. No; his cure for the evils which beset our unhappy neighbours across St. George's Channel is of a very much more simple character. It is work—nothing more. A quotation from John Bright which appears on the title-page forms the keynote of the entire volume. "The greatest cause," said that great orator and statesman, "of Ireland's calamities is that Ireland is idle. Ireland is idle, therefore she starves. Ireland starves, therefore she rebels. We must choose between industry and anarchy." No one who has ever been in Ireland, and assuredly no one who has ever lived there, will dispute the truth of these words. The staple crop of the country, the potato, affords a peren-

nial illustration of this. It is grown simply because it costs less trouble and work than any other. The occupier of a wretched acre or two sticks his potatoes into the ground (or rather his women-folk do for him), and leans against the wall smoking until they come up. And he calls this farming! What inexhaustible resources Ireland possesses in the shape of animal, vegetable, and mineral wealth, and how easily they might be utilised, the reader must go to Mr. Dennis's pages to discover. We cannot help feeling that the circulation of this admirable book throughout the length and breadth of Ireland might almost be a matter of State policy. Certainly any patriot who wished to confer a lasting benefit on the country might employ his money much more unprofitably than in promoting such circulation. It might render impotent the gang who earn their American wages by fomenting outrage and strife.

Romance of the Wool Trade. By JAMES BONWICK, F.R.G.S. (London: Griffith, Farran, Okeden & Welsh. 1887.)—The words "the wool trade" scarcely appear to lend themselves to romance, and yet, within the compass of this book, Mr. Bonwick contrives to pack an amount of information, much of it fresh and all of it interesting, of a character which largely justifies his choice of a title. He treats of the various sorts of sheep scattered over the face of the globe, of their breeding and management, and of wool-production as carried on here and in the Antipodes. He, further, devotes considerable space to a description of wool-manufacture, both as practised in the British Islands and in Australasia. His account of the pioneers of the wool trade in Australia, and of the difficulties against which they perforce had to struggle, might, in parts, almost be taken from the pages of a novel. The perusal of the volume on our table may be commended to everyone who is curious to learn the history of the coat on his own back.

The Kabbalah Unveiled. By S. L. MACGREGOR MATHERS. (London: George Redway. 1887.)—Beyond a general idea that the Kabbalah contains the esoteric philosophy of the Jewish doctors, we venture to think that the acquaintance of the average educated Englishman with the nature of this curiously crazy book might almost be expressed algebraically as a — quantity. Mr. Mathers, then, has rendered a certain amount of service to the mystic and the inquirer into occult methods of exegesis by his English rendering of Von Rozenroth's Latin version of the extraordinary intellectual vagaries of the Hebrew commentators on their Scriptures. That so wonderful a series of examples of misdirected ingenuity and, in places, the most utter childishness should ever have been held to have been taught by the Almighty Himself to a select company of angels, who formed a theosophic school in Paradise (!), affords tolerably strong indication of the intellectual depth to which the recipients of such a creed must have descended, or rather from which they had not emerged. It is simply impossible within the limits of space accorded to reviews in these columns to select illustrations in support of these allegations from the pages before us—even if it would not be blasphemous to do so. It must suffice, then, to say here that the Bible is interpreted by such expedients as those of forming anagrams of the names which occur in it, by assigning numerical values to letters, and so forth. To have discovered that the letters forming the words "Sir Roger Charles Doughty Tichborne the Baronet" may be transposed into "Yon horrid butcher Orton, the biggest rascal here"; or that the numbers equivalent to the Greek letters Γλαδστονη (*i.e.*, 3, 30, 1, 4, 200, 300, 70, 50, and 8) when added together give the number of the beast, 666, would have rejoiced the heart of the Rabbi Simon Ben Jochai, and probably been accepted by his followers as a direct and immediate revelation from Heaven. Verily the Bible has been wounded in the house of its friends, who have tried to read meanings into it of which its various authors were utterly and absolutely innocent; and from Ben Jochai down to Kinns have only obscured what was clear enough to every ordinary intellect already. But although we have said with perfect plainness what we think of the matter of the Kabbalah, we may add that it is worthy of perusal by all who, as students of psychology, care to trace the struggles of the human mind, and to note its passage from animalism through mysticism to the clearness of logical light and that scientific mode of thought and reasoning which can appraise the doting ramblings of the Jewish fathers at their true value.

The Religion of Socialism. By ERNEST BELFORT BAX. (London: Swan Sonnenschein, Lowrey & Co.)—If anyone wishes to see the dreary sophistry and platitudinarian rant of Messrs. Hyndman and Co. presented with such invitingness as an author possessing a certain amount of culture can confer upon it, he may find it in this volume. Whether, though, a thin electro-plating of grammatical, and even in places polished, language really renders the monster of Socialism any more attractive, or serves to conceal the stupendous fallacies underlying its fundamental tenets, the reader must judge for himself.

Disease and Sin. By a MEDICAL MUSER. (London: Wyman & Sons. 1886.)—Here we have "a hap'orth of bread to an intolerable quantity of sack" in the shape of a very few useful comments on disease, but too sparsely scattered in a very ocean of twaddle and preachee-preachee. The "Medical Muser" talks with a kind of pitying contempt of Darwin! and condemns evolution *toto cælo*; believes that the first chapter of Genesis really gives an account of the creation of the visible universe; asserts that man was created perfect (his knowledge of the prehistoric races being, apparently, like the joint-stock companies, "limited"), and so on. His intimate acquaintance with physical science may be gauged from the single sentence we propose to quote from his book. "Light," he says, "is the primary force, for it is positively proved that it does *not* depend upon vibrations of matter"! But it is, of course, open to this unassuming author to assert that the medium filling all space whose vibrations of certain orders do affect us as light is not matter—and perhaps it doesn't matter much, after all.

Labour Capitalisation. By WORDSWORTH DONISTHORPE. (London: Liberty and Property Defence League. 1887.)—It is a long time since we have read a more able and thoughtful work than that whose title heads this notice. We will not weaken or spoil Mr. Donisthorpe's argument by any attempt to summarise it here. It must be read in all its logical sequence to be appreciated. Every one interested in the progress of the working classes, and even in the stability of the nation itself, should obtain and study this trenchant brochure. He can scarcely rise from its attentive perusal without being a wiser man. There is, by the way, one misprint on p. 18, which makes nonsense of the sentence as it stands. It consists in the omission of the words "is not" after "diameter" and before =3·14159. Even a microscopic blunder like this is out of place in an essay of such unquestionable general merit as the one before us.

The Cruise of the Land Yacht "Wanderer." By GORDON STABLES, C.M., M.D., R.N. (London: Hodder & Stoughton. 1886.)—If enthusiasm in a cause were all that is needful to make converts, then might we expect all the passable roads in the kingdom to be thronged in future with more or less luxurious caravans during spring, summer, and autumn: for surely never did man enter more thoroughly, heart and soul, into a novel form of adventure than does Dr. Stables appear to have done in his essay in

"Caravanning." His first essay in his dainty house upon wheels, made in his own county, Berkshire, proved so eminently satisfactory, that he deliberately set himself the task of travelling gipsy fashion up into the North of Scotland, and the record of this tour forms the substance of the book now before us. . . . Starting in the spring of 1886, Dr. Stables journeyed from Berkshire, through Oxfordshire, Warwickshire, Leicestershire, Nottinghamshire, Yorkshire, Durham, Northumberland (skirting the coast), Berwickshire, Haddingtonshire, Edinburgh, Linlithgow, and so to Glasgow. Back through Stirlingshire, and then north through Perthshire, and across the Grampians to Inverness. His "Land Yacht" was a two-ton copy of a gipsy's travelling van, built of solid mahogany and fitted with every conceivable comfort and elegance, giving two powerful horses nearly as much to do as they could accomplish at all in the hilly country through which it passed. The crew, all told, consisted of Dr. Stables himself, his valet cook and factotum, his coachman, a gigantic Newfoundland dog, and an Australian parrot. What he saw, whom he met, how he lived, and what real perils (notably in the ascent of the Grampians) he encountered, the reader must go to his chatty and very readable book to discover. Certainly a freer, happier, or more enjoyable life than he depicts it seems hard to imagine. Of course he is a man of intellectual resource and refined tastes, with a keen eye for the million beauties of nature, a love of music, and a soul for poetry; and it is quite conceivable that a man with fewer endowments might find such a pilgrimage a thought weary at times, especially during a sequence of wet weather; but our author paints his own experience in such fascinating colours that the British Waggon Company (who built "The Wanderer") ought to be inundated with orders prior to the next touring season. All who read this record, and they will be many, will learn of Dr. Stables's sad experience in committing his caravan to the tender mercies of the railway on his return from the far North, and will heartily sympathise with its owner in his grief and disappointment at finding how the Company, or its servants, had "made hay" of all his furniture and delicate fittings when it arrived at its destination. His book concludes with practical hints and advice to all who may think of adopting his somewhat novel form of locomotion, and to such it will be found as useful as it is amusing.

The Young Tea-Planter's Companion. By T. F. Deas. (London: Swan Sonnenschein, Lowrey, & Co. 1886.)—It is only within a comparatively few years that tea-planting in Assam has come to be regarded among the businesses or "professions" to which an educated English youth may profitably devote himself, and has supplied yet another answer to the increasingly difficult question, "What shall we do with our sons?" Mr. Deas, in the entirely practical book before us, goes into the minutest details of the work of a garden and factory, and gives explicit instructions for the cultivation of the plant, its picking, drying, and packing, and even the method of keeping accounts on a tea plantation. Plans and sections of the buildings and bungalows needed are given, with details of their construction; in fact, the work is a complete *vade mecum* for the young planter newly entering upon his work.

Lunar Science: Ancient and Modern. By the Rev. Timothy Harley, F.R.A.S. (London: Swan Sonnenschein, Lowrey & Co. 1886.)—Mr. Harley's book is one which it would be difficult to classify, so inextricably are astronomical constants and sermonising intermixed in it. It contains a considerable amount of fairly trustworthy information on the size, weight, distance, and motions of our satellite; but, if it is to be accepted as a work of reference in connection with these constants, it is a pity that its author did not go to some standard authority like Neison for his quantities, and not depend upon a mere compiler like Mr. Lockyer. In connection with this, should the work before us ever run into a second edition, Mr. Harley may with advantage make the following corrections of statements to be found in pp. 9, 10, 11, and 17. *Imprimis*, the moon's mean distance is 238,840·25 miles, her maximum distance, 252,972 miles; and her minimum distance, 221,614 miles. Moreover, her true diameter is 2,163·06 miles. In the next place, the earth's equatorial diameter is 41,852,404 feet—*i.e.*, 7,926·59 miles—and not "just under 7,926 miles," as stated in his text. These are comparatively trivial amendments, but anyone writing a treatise on lunar physics in the year 1886 is at least bound to furnish his readers with the latest results of investigation in the subject of which he treats. With one portion of Mr. Harley's book we are unfeignedly pleased. With a regard for truth at once creditable to him as a man of science and a clergyman, he discusses the alleged miracle described in Joshua x. 12, 13, only to come to the conclusion that, as he says, "We do not for a moment hesitate to pronounce the story to be apocryphal in essence, and poetical in form." For his cogent reasons for arriving at this conclusion we must refer the reader to the book itself. How much of the book of Joshua was inspired it is needless to discuss here. It is abundantly certain that the interpolation from the book of Jasher was not. The reader unfamiliar with current works in astronomy pure and simple may learn a good deal from Mr. Harley's pages.

Rust, Smut, Mildew, and Mould. An Introduction to the Study of Microscopic Fungi. By M. C. Cooke, M.A., LL.D. Fifth edition. (London: W. H. Allen & Co. 1886.)—Now that a really serviceable microscope is purchaseable for about 5*l.*, and the instrument has become widely popular and diffused to an extent which fifty years ago would have seemed incredible, there is, and must be, *ex necessitate*, a large amount of microscope-power running absolutely to waste for want of some definite scheme of investigation or choice of subject to be studied. To all, then, who are tired of examining a limited series of slides over and over again, Dr. Cooke's work addresses itself, and introduces them to a world of wonders—only, in a majority of cases, too close at hand—which will furnish an inexhaustible storehouse of work for the student. Whether we consider the colouring, the form (in certain cases quasi-geometrical), the life-history and mode of reproduction of these minute and humble forms of vegetable life, or the important part they play in the economy of nature, we cannot fail to be struck with the vast field for research which their structure and formation present. That Dr. Cooke's capital little book has supplied a distinct want we have evidence in the fact that it is the fifth edition that lies before us. His language is always plain and intelligible, and his descriptions of the various lowly fungi of which he treats are admirably illustrated by no less than 269 figures drawn and coloured after nature by Mr. Sowerby. Every possessor of a microscope should have this book on his shelves.

A Synopsis of Elementary Results in Pure Mathematics. By G. S. Carr, M.A. (London: Francis Hodgson. Cambridge: Macmillan & Bowes. 1886.)—The author, or compiler, of this wonderful monument of patient industry may well be congratulated on having produced a work of perennial value to the student. Containing no less than six thousand propositions, formulæ, and methods of analysis, with abridged demonstrations, it ranges over the entire field of pure mathematics, and embodies every useful proposition in the various branches of which it treats. The student reading for his examination, alike with the advanced mathematician, will find Mr. Carr's volume simply invaluable

as a work of reference. Practically everything that he has met with in his reading he will here find succinctly explained and illustrated by an appropriate demonstration. It contains the essence of a very large number of works indeed, and to all who have previously studied any of the very various subjects with which it deals, it will almost stand in the place of an extensive collection of books. The figures are models of clearness, and the index is exhaustive. It is, in fine, emphatically a work without which no mathematical library can be complete.

Proceedings of the Society for Psychical Research. May 1887. (London: Trübner & Co.)—In the year 1884 an attempt was made to get this magazine to advertise a person named Eglinton, a slate-writer; first by sending a book to us for review, and then by a frantic effort of a certain "spiritualistic" journal to provoke us into a discussion. Both, of course, failed, and Eglinton had to announce his tricks through some other medium. One of the most interesting things—among many—in the May part of the *Proceedings of the Society for Psychical Research* is a description of certain experiments, and a discussion of their results, which throw the strongest possible light on the way in which this Eglinton deludes the fatuous creatures who resort to him as a means of communication with the other world. We would urge every one interested in this form of imposture to obtain the number of the Society's *Proceedings* now before us straightway, and to read the papers by Professor Carvill Lewis and Messrs. Hodgson and Davey with all the care and attention he can bestow upon them. They will be found amply to repay the trouble. Nor, as we have previously intimated, will the remainder of the number be found destitute of interest, containing, as it does, the presidential address of Professor Balfour Stewart and several essays by Messrs. Myers and Gurney. The weakest part of the "psychical" case, as expounded in the volume on our table, is, as it seems to us, that founded on the observation of so-called hypnotic phenomena; as, within our own experience, there is no class of performance which so readily lends itself to impostures as this does, or in which such imposture is so difficult to detect.

Geology of Northumberland and Durham. By G. A. LEBOUR, M.A., F.G.S. (Newcastle-upon-Tyne: Lambert & Co. 1886.)—Originally prepared as a text-book for Professor Lebour's Class of Geological Surveying, his work has expanded in this, its second, edition into a compendium of the geology of our two northernmost English counties. Himself apparently more especially a physical geologist, Mr. Lebour furnishes a quantity of information with reference to the palæontographical character of the strata which he describes, in the shape of numerous pretty complete tables of the fossils found in them. Five plates and seventeen woodcuts in the text sufficiently illustrate a volume which will certainly be found valuable by all scientific visitors to Northumberland and Durham, and by others who may wish to learn all that is known as to the geological structure of those counties.

On Forecasting the Weather. By B. G. JENKINS. (F. Hayez, Brussels. 1887.)—Unless our memory is more treacherous than usual, the last time we met Mr. Jenkins in print was on the announcement of his having found a celestial mare's-nest in connection with a luminous spot on the planet Mercury in transit. His latest discovery in equine nidification takes the form of a revelation that the weather has a sixty-two-year period, and that this is strictly referable to a lunar cycle of identical duration, at the end of which he asserts the moon is in apogee, and perigee in new and full, &c., at the same dates that she was sixty-two years ago. Now, *imprimis*, this is simply untrue; albeit what is asserted really happens at the end of fifty-four years *plus* thirty-two or thirty-three days. Proceeding, however, we find the discrepancies between Mr. Jenkins's years of comparison disposed of on the assumption of "inequalities in the moon's daily motion"!!! Furthermore, Mr. Jenkins's months are calculable from a certain time after apogee to a certain time after the succeeding apogee; while the greatest amount of rain falls, as he asserts, about three months after the nearest approach of the moon to the Earth! We learn with unbounded surprise that all this stuff has been printed at the cost of the Royal Academy of Belgium, "after being examined by an astronomical commission." We are most curious to know the names of the astronomers (?) who sanctioned such publication.

Transit Tables for 1887. By LATIMER CLARK, F.R.A.S., M.I.C.E. (London and New York: E. & F. N. Spon. 1887.)—Once more we greet with sincere gratification the appearance of Mr. Latimer Clark's excellent and most useful little volume of tables, indicating as its annual appearance does the existence of an extensive public interest in the question of obtaining rigidly accurate time, independently of local clocks and other imperfect methods of ascertaining it. Furnished with one of the cheap and efficient transit instruments of Mr. Clark's invention, and the volume before us, anyone and everyone, be his position the most isolated possible, may determine his time within a fraction of a second—a boon only to be realised by those who have once enjoyed it. How it is to be obtained may be learned from Mr. Clark's full and instructive preface.

Alpine Winter in its Medical Aspects. By A. TUCKER WISE, M.D., L.R.C.P., &c. (London: J. & A. Churchill. 1886.)—The favourable notice of the first edition of Dr. Tucker Wise's book, which we felt it our duty to give on p. 346 of our Sixth Volume, is justified by the appearance already of its third. It certainly deserves the careful study of all afflicted with lung disease.

Household Health. By B. W. RICHARDSON, M.D. (London: Society for Promoting Christian Knowledge. 1886.)—A book to be commended to every occupier of a house, be his social rank what it may. The extraordinarily low price at which Dr. Richardson's work is published renders it eminently suitable for distribution among a class whose neglect of household hygiene is a chronic source of danger in large towns and cities.

THE FACE OF THE SKY FOR SEPTEMBER.

SPOTS in varying numbers, though rarely of any considerable size, continue to appear from time to time on the sun's disc. Towards the end of September the zodiacal light may be seen in the east before sunrise. The aspect of the night sky is shown on Map IX. of "The Stars in their Seasons." Mercury is a morning star at the beginning of the month, but passes behind the sun on the 10th, and subsequently becomes an evening star. He is very indifferently placed for the observer throughout September. Venus begins September as an evening star, but comes into inferior conjunction with the sun on the 21st. At and about this date she is a glorious object in the telescope, and particular attention should be paid by the observer to the visibility, or non-visibility of her dark limb. The night sky, in so far as the planets are concerned, is an absolute blank, the whole of those exterior to the earth being, for the observer's purpose, invisible. The moon is full at 11h. 12·7m. A.M. on the 2nd, enters her last quarter at 3h. 3·2m. in the afternoon of the 10th, is new at 1h. 59·8m. P.M. on the 17th, and enters her first quarter at 5h. 3 9m. in the early morning of the 24th. The moon will occult six fixed stars during the present month. The first is the 6th magnitude one, 29 Sagittarii, which will disappear at the moon's dark limb on the 24th, at 10h. 43m. P.M., at an angle of 180° from her vertex. She will have set ere it reappears at her bright limb. On the 25th Sagittarii, a

star of the 5th magnitude, will disappear at the dark limb at 11h. 27m., at a vertical angle of 125°; but, as in the previous case, the moon will have set prior to its reappearace. On the 26th B.A.C. 7053, of the 5½th magnitude, will disappear at the dark limb of the moon at 5h. 35m. P.M., at an angle from her vertex of 73°. It will reappear at her bright limb at 6h. 55m. P.M., at an angle of 270° from her vertex. One minute after its disappearance, another star of the 5½th magnitude, ρ Capricorni, will disappear at exactly the same spot in the lunar limb, as B.A.C. 7053 itself, reappearing simultaneously with it at the bright limb, at a vertical angle of 269°. On the same night, one minute after midnight, υ Capricorni, also of the 5½th magnitude, will disappear at the dark limb at a vertical angle of 93°; but the reappearance will take place below our horizon. Finally, on the 28th, 42 Aquarii, a 6th magnitude star, will disappear at the dark limb of the moon at 10h. 14m. P.M., at an angle of 65° from her vertex. Its reappearance will happen at 11h. 1m. P.M. at her bright limb, at a vertical angle of 1°. At noon to-day the moon is in Aquarius, through which constellation she is travelling until 9 A.M on the 3rd, when she enters Pisces ("The Seasons Pictured," plate xxii.). Here she continues until 10h. A.M. on the 4th, when she passes into Cetus. Skirting the confines of the two constellations, she re-emerges in Pisces at noon on the 5th, only, however, to re-enter Cetus at 11h. A.M. on the 6th. She finally quits Cetus at 7h. A.M. on the 7th, and crosses into Aries ("The Seasons Pictured," plate xxiii.). At 10 A.M. on the 8th she leaves Aries for Taurus, and is passing through it until 8h. A.M. on the 11th, at which hour she arrives at the northern prolongation of Orion. It takes her until 7 o'clock the same evening to cross this, and she then comes out in Gemini. By 1 P.M. on the 13th she has traversed the last-named constellation and passed into Cancer ("The Seasons Pictured," plate xxiv.). Her journey through Cancer is completed by 1h. A.M. on the 15th, when she enters Leo. Here she remains until 10h. 30m. A.M. on the 17th, at which hour she quits Leo for Virgo ("The Seasons Pictured," plate xxv.), her journey through which terminates at 5h. 30m. A.M. on the 20th, when she crosses into Libra ("The Seasons Pictured," plate xxvi.). As she travels through Libra she arrives at midnight on the 21st on the western edge of the narrow northern spike of Scorpio. Eight and a half hours later she has crossed this and entered Ophiuchus. She leaves Ophiuchus at 1h. A.M. on the 24th for Sagittarius, and Sagittarius in turn for Capricornus at 9h. 30m. A.M. on the 26th ("The Seasons Pictured," plate xxi.). At 11h. A.M. on the 28th she crosses the boundary into Aquarius. Her passage through Aquarius is completed by 1h. P.M. on the 30th, and she then, for the second time this month, passes into Pisces ("The Seasons Pictured," plate xxii.). She is still in Pisces at midnight on the 30th.

Our Chess Column.

BY "MEPHISTO."

THE great International Chess Tournament, the fifth congress of the German Chess Association, was begun at Frankfürt on July 18, and concluded on August 2 with the victory of Captain Mackenzie, who reached the fine score of 15 wins out of 20 games played. This result is all the more creditable as this tournament, with twenty-one competitors, was the largest on record, and, on the whole, it contained as strong a lot of players as ever met together to engage in a tournament. Blackburne tied for second place—always a creditable position—he having an equal score with Weiss, of Vienna, namely, 13½ each. No other English competitor took a prize. Not many novelties have been displayed in the treatment of the openings. The Ruy Lopez and the Queen's Pawn opening have had an undue share in the *début*. The second player in the Queen's gambit declined, *i.e.*, P to Q4, followed by P to QB4, &c., have several times defended successfully with P to QB3, and have eschewed playing P to QB4. The Sicilian defence has proved itself entirely wanting, and will probably not be resorted to again by modern players. The normal form of the King's gambit has been played with success by Metger against Englisch, and has apparently been discarded without sufficient reason. The Vienna game has on more than one occasion not yielded a satisfactory result to the first player on persisting in playing 3. P to KB4 after Black played 2. Kt to KB3. Finally, we may mention that Tarrasch obtained a good game by defending the Steinitz gambit played against him by Burn with 4. Q to R5 and 5. P to KKt4.

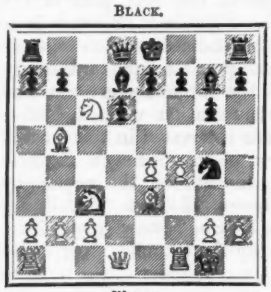
Appended are a few specimens of the play at the tournament.

Game played in the third round between the first prize-winner and Dr. Tarrasch, who divided fifth and sixth prizes with Professor Berger:—

SICILIAN DEFENCE.

WHITE. Mackenzie.	BLACK. Tarrasch.
1. P to K4	P to QB4
(See introduction for remark on Sicilian Defence.)	
2. Kt to QB3	Kt to QB3
3. Kt to B3	P to KKt3
4. P to Q4	P × P
5. Kt × P	B to Kt2
6. B to K3	P to Q3
7. B to QKt5	
(The B is better placed on K2.)	
7.	B to Q2
8. Castles	Kt to B3
9. P to B4	
(P to KR3 was necessary to present Kt to Kt5.)	
9.	Kt to KKt5 !
10. Kt × Kt	

BLACK.



WHITE.

10.	P × Kt
(Kt × B instead would have led to exchanges of pieces not disadvantageous to Black as second player.)	
11. B to Q4	P to K4
(Of course Black played for winning a piece. For a safe end-game he might have played B × B. 11. Q × B, Q to Kt3, &c.)	
12. P × P	P × B
(An oversight. Black should have played P × P instead. Then if 13. B to B5, B to Bsq best, and Black should win.)	
13. P to K6 !	Kt to K4
14. P × B (ch)	Q × P
15. B × Kt	B × B
16. Q to Q5	Castles KR
17. Kt × P	QR to Ktsq
18. P to QR4	P to QR3
19. Kt to Q4	Q to R2
20. P to B3	R × P
21. K to Rsq	Q to Q2
22. P to R3	R to Bsq
23. Kt to B3	

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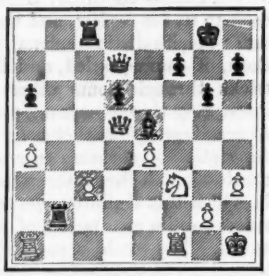


WHITE.

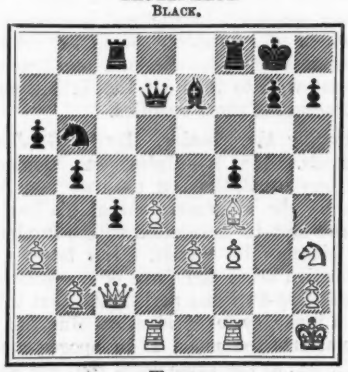
(Making a dash for an attack.)	
23.	B × P
24. Kt to Kt5	R to B4
25. R × P	R × Q
26. R × Q	R(Q4) to Q7
27. R to QBsq	R(Q7)QB7
28. R to KKtsq	B to Q5
(A blunder. Any other move would have done.)	
29. R to Q8 (ch)	K to Kt2
30. Kt to K6 (ch)	Resigns

The following game was played on the 5th round, and may serve as a fine illustration of the rapid and skilful mode of attack adopted by Blackburne. He continued as follows:—

Position after Black's twenty-second move.

TAUBENHAUS.

BLACK.



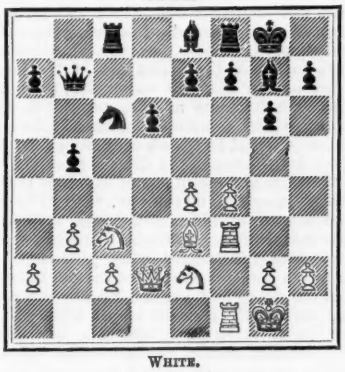
WHITE.

BLACKBURNE.

WHITE.	BLACK.
23. R to KKtsq	B to B3
24. R to Kt3	Kt to Q4
25. QR to KKtsq	R to KB2
26. B to R6	K to Rsq
27. Q to Kt2	P to B6
(R to Ksq seemed preferable.)	
28. P × P	R × P
29. Kt to Kt5	B × Kt
(If R to K2 White may play Kt to K6.)	
30. R × B	R to B2
31. Q to Kt3	P to B5
32. Q to R4	P to Kt3
33. P to K4	Kt to K6
(Kt to K2 was better.)	
34. R × KtP !	P × R
35. B × P (ch)	K to Ktsq
36. B to K5 !	R to Kt2
37. Q to R6 !	R to B3
38. Q × Kt	
(All very fine play; if R to R2 then 39. P to Q5.)	
38.	Q to KB2
39. P to Q5	R to B7
40. B × R	Q × B
41. Q to B4 and White won.	

Position resulting out of a Sicilian defence played at Frankfürt :—

GOTTSCHALL.
BLACK.



WHITE.
GUNSBERG.

The game terminated as follows :—

WHITE.	BLACK.
R to R3	P to Kt5
Kt to Q5	P to K3
P to B5	P × Kt
P to B6	B to Rsq
B to Q4	B to Q2
R to R4	P to R4
(If Kt × B White wins by Q to R6.)	
R × P	B to Kt5
R × B (ch) and wins.	

Our Whist Column.

BY "FIVE OF CLUBS."

THE DISCARD IN ITS SUIT-DIRECTIVE ASPECT.*

IN three letters contributed to recent numbers of *The Field*, General Drayson dealt with the "suit-directive" aspect of the question of the discard, with the apparent object of contributing his quota to the modern industry of importing the greatest possible number of cut-and-dried rules into the practice of the game of whist. He considers four cases, of which two are general and two are particular. In summarising the conditions which he discusses, we shall assume, once for all, that A and B are partners against Y and Z; that A is always the elder hand; and that the lead first described is the original lead of the game. His four cases, then, are as follow :—

1. (General.)—A leads trumps. Z wins, and returns the trump; Y is obliged to discard. Ought Y's discard to be from his strong or from his weak suit?

2. (General.)—A leads trumps. Z wins and returns the trump. B is obliged to discard. Ought B to discard from his strong or from his weak suit?

3. (Particular.)—A leads trumps (say clubs), and the trumps are evidently with Y and Z. Y holds spade 8, 7, 5, 4, 3; diamond A, Kg; club 9, 6; heart, 9, 8, 3, 2. On the third round of clubs Y must discard. Which card ought he to throw away?

4. (Particular.)—A leads trumps (say clubs), and trumps are declared against Y and Z. Y holds spade A, Kg, Q; club 7, 6; diamond A, Kg Q; heart 7, 6, 5, 4, 3. On the third round of trumps Y must discard. Which card ought he to throw away?

To his general questions General Drayson replies that, in the first case, Z has returned A's adverse trump lead. Hence trumps are not declared against the co-partnership of Y and Z. Therefore Y ought to discard from his weak suit. But, in the second case, Z has returned A's trump lead up to B's weakness in trumps. Therefore A is placed in the position of having to fight single-handed against the combined trump strength of the adverse co-partnership. Therefore B ought to discard from his strong suit. These sentences do not give the exact terms in which General Drayson formulates the principles by which he regulates his practice; but they convey a clear idea as to the hard-and-fast system which he wishes to establish in order to minimise the trouble of thinking about the varying conditions of play as they arise. In its broader aspect, of course, we do not object to General Drayson's idea. For there can be no doubt that it is desirable to lay down general principles by which to regulate the protective discard. But for all practical purposes the rule given by Mathews at the beginning of the century is amply sufficient :—"If weak in trumps, keep guard on your adversaries' suits; if strong, throw away from them." Besides, from the terms in which General Drayson writes, it is pretty plain that he is one of the very numerous believers in the fallacy that under all circumstances length of plain suit means strength. It cannot be too often repeated, however, that in themselves five or six minor cards of a plain suit are an element of weakness, and that the conversion of such weakness into strength requires (1) that the holder should have opportunities of clearing the suit, and (2) that he or his partner should either be protected in trumps or else that one of them should have either the command of the adversaries' plain suits or at least the power of obstructing their establishment.

With regard to the first of General Drayson's particular cases, it is clear that to the third round of trumps Y cannot discard either his ace or his king of diamonds. He must evidently throw away either one of his five minor spades or one of his four minor hearts; and probably, in the majority of cases, his best course would be to part with a spade—the chance of ultimately making the nine of hearts being somewhat better than the chance of ultimately making the eight of spades. In General Drayson's fourth case there can be no room for doubt at all. Y must throw away one of his small hearts, retaining the complete command of diamonds and of spades; for his cards in both those suits are good of themselves against anything but trumps, while his small hearts are valueless so long as higher hearts are held by the other players. Since tricks are to be made, what can it matter whether the making of one of them be the prompt work of the diamond ace or the deferred privilege of the heart seven?

General Drayson does not think it necessary to supply any answers to his own questions. But he proceeds to remark that he has met several whist-players who claim that, in dealing with the difficulty of the protective discard, the only thing to be borne in mind is whether the original trump lead was by partner or by adversaries. He gives the following illustration :—Being Y, he held spades, 3 small; diamonds, 2 small; club A, Kg, Q, 3, 2; and hearts (trumps), 3 small. Nothing is said about the score. The play was that A led tierce major in trumps, and that B failed on the third round. Then A led the king of spades, which Z won with the ace. Next Z led the knave of hearts, to which Y discarded a diamond. Whereupon Z led a diamond, finding the complete command both of spades and of diamonds with his adversaries; the ultimate result being that Y made only one trick in clubs. General Drayson maintains, and rightly maintains, that under the circumstances stated, Z ought not to have led a diamond. It is clear that Z not only had a very bad hand, but also that he knew that the strength of the spade suit lay against him. Under such circumstances his play in drawing A's losing trump was very much of a leap in the dark. Its only justification would have been that, being obliged to rely for defence on Y's hand, he played the winning trump in order to ascertain Y's strong suit by inviting him to throw away a losing card at a time when the command of trumps was in his favour. No wooden-headed rules—"apt for blockheads," as "Mogul" said the other day—would have sufficed to supply such a player as Z with the sense (in which General Drayson shows him to be quite deficient) of the importance of noting the time at which, and the circumstances under which, Y was

* From the *Australasian*.

XUM

forced to discard. Z, apparently, is a player who draws an adverse losing trump merely because he has got the idea into his head that it is his duty to prevent its ever winning a trick; but at the same time, without reflecting that if he has not a clear impression as to what he ought to do next, it would be better to make his leap in the dark before he parts with the trump command for the mere pleasure of disarming an adversary.

It is absurd, then, to attempt, as General Drayson has done, to lay down canons of play to meet circumstances such as he contemplates in his illustrative case. In framing conventional rules it is impossible to make sufficient allowance for the "personal equation" of the player by whom they are to be applied.

General Drayson suggests, however, that when a player, who holds five minor cards of one plain suit, together with commanding but numerically short strength in the other two, is compelled to part with one of the former, the proper thing for him to do is to throw away an unnecessarily high card. This is to be a new convention—to be known as the convention of "change your suit from the suit which your partner is now throwing away." It is a development, according to its ingenious proposer, of the "call for trumps"—being intended as a call, when trumps have been drawn, for one or other of the remaining plain suits—the one being clearly indicated in the preceding illustrative example, as necessarily being the club. It is now nearly three years since General Drayson invited "progressive" whist-players to turn their attention to his idea of adding the "plain-suit Peter" to the recognised conventions of the game, and he remarks somewhat plaintively, that, hitherto, his proposition has neither been examined nor practised. He thinks, however, that now that "American leads" have been fairly worked out the time is ripe for further attempts to tamper with that portion of whist in which—despite of all the "extensions" that have been hitherto based on the absurd assumption that a principle is something of an elastic character—the difficulties of the discard still survive to tax the judgment of the whist-player. We are glad, however, to note that, for the moment, at all events, the general's proposal has a very fair chance of being quietly ignored by the London whist-playing world.

There are several reasons for drawing this deduction. In the first place, it is to be observed that in KNOWLEDGE, which, with the exception of the *Field*, is the only journal in London in which whist questions are regularly discussed, "Five of Clubs" (Mr. Richard A. Proctor) no longer maintains towards the modern conventions the attitude of unquestioning acceptance to which he committed himself in the early days of his whist editorship. Moreover, not content with modifying his own views on conventional play, he has published a series of articles from "Mogul's" pen, of which the first opened with the argument that the quality which gives to whist its greatest charm is that it exercises the faculty of reasoning from the known to the unknown. Hence the introduction into the game of signals which convey positive information cannot but be regarded as tending to make whist less scientific, and consequently, to lower its character. It follows, then, that Pole outrages common sense when he calls modern whist, as compared with the whist of Mathews and Deschapelles, the "scientific" game. For, in point of fact, modern whist is only the old and really scientific game, *plus* certain "dodges for giving information which are known as signals."* These are purely mechanical. Therefore, they are "unscientific." For the very essence of a signal is that, by virtue of a previous convention, it conveys certain definite information. Moreover, as a matter of fact, so entirely does the meaning of an arbitrary signal depend upon a prior understanding, that two of the modern signals were once regarded as conveying different information from that which they now give. If the matter be examined carefully it will be found that one of two things must be true. Either supposing all the players at a table to be possessed of equal skill, the adoption of signals gives no advantage to any one of them over any other; or else if better players are pitted against worse, the latter ought to have a handicap in their favour. In the latter case, since, as a rule, odds are not given at the whist-table, signals ought to be "squelched" without further argument, while in the former there is no reason for introducing them. Why not be content, then, with leaving well enough alone?

Such outspoken language as this is sufficient indication that at length efforts are being made to open the eyes of the London whist-playing world to the fallacies of the reasoning by which Cavendish has succeeded for a long series of years in persuading himself and in persuading many disciples that whist is improved by the introduction of arbitrary and purely mechanical signals. According to "Mogul," the secret of his success is that "the inferior players, always constituting a majority," have been only too glad to avail themselves of anything "which, apparently, they can use as well" as the most gifted and the most skilful. To this is to be added the obvious consideration that whenever any fad creeps in among the members of a whist-circle, the non-faddists must either make the best of the situation, or else they must resign themselves to the prospect of going without their customary rubber. There remains, however, a third fact of even greater significance than either of the two we have already mentioned. Cavendish, whom "Mogul" dubs the "arch-inventor of signals," lost no time in declaring his opinion that "the difficulties of the discard cannot be satisfactorily disposed of" by General Drayson's "cast-iron rules." Nor is this only an indication that Cavendish is annoyed at finding that another convention-monger has been poaching on his own pet and peculiar manor. For the fact is, says Cavendish, that "the discard is often a matter of judgment. Judgment cannot be taught by letters in the *Field*, nor by whist-books, however practical." No doubt the existence of spite in measurable quantity may be inferred from the fact that in the *Field* the "practical" of the immediately preceding sentence is printed with a capital "P." But the whist world is concerned only with Cavendish's change of front on the convention question, and need not trouble itself about the exact amount of irritation of temper with which he has begun to write off the six million and odd square inches of pica type which embody his long-continued efforts to knock the brains out of his favourite game. Moreover, sudden as has been his conversion, there need be little doubt that, although it seems to have come with a rush, it will prove to be thorough and complete; for already, in one paragraph of his criticism of General Drayson's suggestions, he says that, "of all modern whist developments, the discard from the strong suit is the one about the value and soundness of which no reasonable doubt can exist." This statement, by the way, "Mogul" absolutely contradicts in the second of his KNOWLEDGE articles. The only objection to the modern rule, continues Cavendish, is that to apply it properly "requires the keenest whist judgment." In another paragraph Cavendish remarks that "people who follow the rule of discarding from the strong suit because the adversary has started a trump lead are not worthy of being called whist-players." Nor is this all. For in a third paragraph he, the greatest sinner alive in that particular respect, remarks that "people talk and write about whist as though it could be played by a machine." To which he adds the naïve confession that "no doubt there are many players who regulate their plans by 'book alone,' but they never rise above mediocrity." From the class of writers, however, whom Cavendish has in his mind, he expressly exempts General Drayson by name, thus gracefully preparing for the new era in his own history as a writer on whist, in which he himself will deserve to be paid the same compliment. Nor is there anything surprising in the suddenness of his apparent conversion from the familiar errors of his ways. It is quite in accordance with the known peculiarities of his natural temperament. For, as Pembridge humorously remarks in the "Decline and Fall of Whist," "the constitution of whist and the constitution of our beloved country are both at the mercy of a grand old man of exuberant verbosity. Each [of these] is able in some extraordinary way to persuade himself that the side of any question on which he happens to be looking is not only the right side, but that it positively has no other; [and this, too,] in spite of the fact that in previous stages of his existence he has himself both recognised and vehemently supported that other side."

* There is more of true whist science in "Mathews on Whist" than in all the modern treatises put together, excluding what has been derived from Mathews.—"FIVE OF CLUBS."

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